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MINING.

WHAT COAL IS.

The following is an extract from a lecture delivered by Dr. PERCY, F. R. S., at the Royal School of Mines Museum of Practical Geology, London:

We all fancy that we know perfectly well what coal is, and that there would be no difficulty in construct, ing a suitable definition of coal; and yet it is probably one of the greatest difficulties one could have to solve to give such a definition of coal as would be unmistakably and perfectly applicable to all the substances we term "coal." The question gave rise to a very extensive and costly trial some time ago in Edinburgh, the results of which have been recorded in a quarto olume which we have in the library. It is quite amazing to see the varied opinions expressed on the subject. Numerous witnesses were examined—some chemists, some botanists, some mineralogists, some geologists, and some gas engineers, and the evidence was extremely conflicting, half a dozen witnesses saying one thing, and half a dozen another; so that the Judge and jury were all puzzled, and the scientific evidence was altogether ignored, The Judge took a common sense view of this subject, but they could not succeed in producing a satisfactory definition of coal. Perhaps a near approach to a definition of coal would be the following:—We may define it to be "a solid mineral substance, more or less easily combustible, and varying in color from dark brown to black; opaque, except in very thin slices; brittle; not fusible without decomposition; not sensibly soluble in ether or turpentine; and not containing sufficient earthy matter to prevent its being applied as a source of heat." You will see one difficulty about this in a moment. Coal in coal beds occurs along with shaley matter. Coal generally contains, as we shall see presently, a clay with which it is associated. We may get a coal which contains a considerable amount of shaley matter, and a shale which contains a considerable amount of carbonaceous matter. Now, I should like any one to tell me where the coal ceases and the shale begins. We may have a shale containing 1 per cent. of carbonaceous matter, and we may have others containing 2, 3, 4, 5, 6, or 10 per cent., and so on, till at length we get what people would call coal; but it is impossible, I think, to define exactly where the one begins and the other ends. There is no doubt as to the nature of peat, because we see the transformation from living vegetable matter to peat. Coal is also as certainly derived from vegetable matter. We find the remains of plants associated with the coal, above the coal, and below the coal. There is no question whatever about that fact.

Let me now direct your attention to the varieties of coal which occur There are some points which I think you will admit to be of geological interest in connection with this part of our subject. We begin with woody tissue, pass on to peat, and then arrive at coal. We have a class of coal approximating to peat in composition, intermediate between peat on the one hand, and our true so-called bituminous coals on the other. To this intermediate description of coal the name of lignite has been given, or brown coal. We have valuable deposits of this lignite occurring at Bovey Tracey, in Devonshire. Lignite is found also in various other parts of the world. I have collected analyses of different sorts of lignite, and presented them in the form of a table. There is one point about them which is characteristic: they all contain, so far as my experience goes—I speak here of course with a certain degree of reservation—a considerable amount of hygroscopic water—much more than any true coal I ever saw—sometimes 15, 18, or 20 per cent.; and in so far these varieties of lignite resemble wood in a remarkable degree. All our common wood, dry as it may appear—even this deal table which I now touch—contains a large amount of water which may be displaced by exposing the wood to a temperature below that required to effect its decomposition. The volatilisation of water from wood, and its re-absorption from the air under different conditions, occasions that crackling which we hear in our furniture from time to time. The water of the lignite may be expelled by exposing the substance to a certain amount of heat, but on cooling and re-exposure to the air, it re-absorbs the water which it has lost.

We have bituminous coal, occurring in England, Staffordshire for example, which comes next in order after lignite. Then we have a steam coal from the Tyne, and at last the so-called anthracitic coal from Wales. I have drawn up a table, so as to give you at a glance the comparative composition of all the typical varieties of coal. The figures are deduced from a very large number of analyses. I will take the carbon as represented by 100 in every case, so as to enable you to compare the successive changes in composition which take place from wood to coal. I will ignore the nitrogen as not a material item in our consideration:

	Carbon.	Hydrogen.	Oxygen.
Woody tissue.....	100	12.18	83.07
Peat	100	9.85	55.67
Lignite.....	100	8.03	42.42
South Staffordshire coal	100	6.12	21.23
Steam coal from the Tyne...	100	5.91	18.32
Steam-anthracitic coal from South Wales.....	100	4.75	5.28
Anthracite from Pennsylvania	100	2.84	1.74

That table is drawn up with a great deal of care from a vast number of analyses, and it will give you at a glance the comparative composition of all these varieties of carbonaceous deposits from wood down to anthracite, which is the farthest removed from wood in composition. You see how beautifully gradual the change is all the way down. Mark the great diminution of oxygen in peat compared with the quantity contained in the woody tissue. You will, of course, understand with regard to lignite that the various lignites differ considerably in composition, but the analysis I have just presented to your notice is an average taken from the analysis of several varieties from different parts of the world. You see how the quantity of carbon creeps up as we get away from wood. The South Staffordshire coal, of which I have given you the composition, is of the same sort as occurs in some other parts of England. It is a free-burning coal, that is to say, it burns without caking together like our Newcastle coal, and produces a long flame. It is extensively used in Staffordshire, not only for household purposes, but also in metallurgical operations. There is a great diminution in the oxygen compared with lignite, and yet this variety of coal contains more oxygen than any other varieties of coal we have. The amount of oxygen is quite characteristic. I need hardly say that the less oxygen we have under ordinary conditions the better the coal, because the oxygen is almost all so much dead loss. The oxygen that we find in coal may be regarded as existing in combination with hydrogen in the state of water, and does not cause heat; but on the contrary, it has to be evaporated, and must cause a loss of heat. We have an abundance of anthracite from South Wales of nearly the same composition as the anthracite from Pennsylvania, of which I have given you the analysis.

We have all seen, in walking by a stagnant pool, from time to time, little bubbles of gas starting up on the surface of the water. If we collected that gas and burned it, we should find that it is light carburetted hydrogen or marsh gas, containing more or less carbonic acid. In our coal mines, we find that marsh gas exists in the coal much in the same way as condensed air exists in spongy charcoal. By abstracting from woody tissues certain proportions of hydrogen, carbon, and oxygen in the two states of carbonic acid and carburetted hydrogen, we can produce every variety of carbonaceous deposit, the composition of which I have represented to you in the table I have given.

GREAT BLAST, ARDSHEAL GRANITE QUARRIES.—Preparations have been in progress for some time past for a great blast at the Ardsheal quarries on the banks of Loch Linnhe, Scotland. The height of the quarry face was forty-two feet above the level of the quarry floor, and at a point seventy feet back from the face, and seventy-two feet above the level of the floor. A vertical shaft, about four feet square, was sunk from the surface of the mountain to a depth of forty-five feet. At the bottom of this shaft a mine or heading was driven at a right angle in a parallel line with the quarry face. This heading was twenty-five feet in length and seventy feet from the face of the quarry. At the end of this heading the chamber to contain the gunpowder branched off at a right angle towards the front. The chamber was hewn out of the solid rock somewhat in the form of a balloon. The gunpowder was carefully let down in bags, each containing twenty-five pounds weight. In this way two tons of gunpowder were safely deposited; but as this operation had to be effected in darkness, all connection between the gunpowder and the heading was stopped, so as to permit of light being freely used to enable the miner to complete the important operation of stemming up the mines. At seven o'clock on Thursday evening, the 9th, the patent safety fuses were ignited, and in thirty minutes thereafter the explosion took place, causing the mountain to groan and quiver, and bringing with it upwards of 20,000 tons of excellent granite.

GIRARD COPPER MINE.—A letter dated Copper Harbor, Michigan, June 22, 1864, says:

"We are ready to commence building the dam; the preliminary work is completed, except a part of our new wagon road. Upon surveying the water-power, I find it can be used economically; there is an excellent site for the dam, on a rock bottom; there will have to be about 500 feet of race and flume constructed, to reach the mill site.

We are building a new wagon road from the Montreal river, above the Star stamp mill, to our mill site, with a branch road to the Copper Creek mine works; the Reliance Company assist in making this part, also the bridge over the river. A good road through the property is indispensable.

The shaft at Copper Creek is making fair progress, and continues to show a good vein. We have started explorations on the Copper Harbor veins, and expect soon to develop them."

FROM ARIZONA.

A correspondent to the New York *Tribune*, under date of June 4th, at Tucson, A. D., says:

"The great question of this country is a mineral one—is there such an abundance of the precious metals that are so accessible, as to invite a large population? Various and conflicting reports and opinions exist in regard to this matter. As a pecuniarily uninterested party, I will give some conclusions arrived at, after actual investigation, so far as opportunity has offered, and duly considering all the evidence and information I have been able to obtain. The three main placer districts are known as Lynx Creek, Hayscampe, and Antelope. Some considerable amounts of gold have been taken out of claims in those districts. Gold deposits were found to be in scattered positions, and nothing certain could be relied upon in working any claim. After some ten months' labor in these mines, it is fully demonstrated that there is no great amount of gold in those districts. At this time, both gold and water have given out, and nothing is doing of any amount. In fact, placer mining in this Territory, so far as prospected, is a failure; and many of the best informed miners are of the opinion that there has not been as much gold taken out of the placers as has been expended by the miners; hundreds of whom have left the country wholly destitute. What further prospecting may reveal, remains to be seen. Great expectations are still at par.

Innumerable quartz claims have been located in the above-named districts, and their owners are confident of their paying quality; but of their actual value, nothing is yet known; they may be rich, or not worth a cent.

In the region south of this, and in the vicinity of Tubac, there are innumerable lodes of silver quartz on which claims have been located and mines opened. Several companies organized in the States have mines in this region, and some have their agents here looking after them. As yet, their value is undemonstrated, and they serve only as a basis of speculative or losing operations. Some little work is going on in some of them, but no ore will be smelted within a twelvemonth hence. There is no doubt, but, that great mineral treasure exists in the Territory. At present, it is a question where, and when will it be made available?

Mr. Ehrenberg, a learned geologist and metallurgist, deems this middle portion of the Territory the poorest in minerals, and thinks the great mineral belt of the Territory lies east of this point.

An expedition against the Apaches started from several points on the 1st. inst., and it is hoped that great success will attend it. Until the Apaches are subdued, nothing of importance can be done at mining, farming, or stock-raising in this Territory.

Allow me to add that, in my opinion, the mineral prospects of the country do not at present invite any person to the Territory, if he seeks either wealth or a home."

Reliance Mining Company.—Reports from Lake Superior generally represent mining operations there as being pushed forward with great vigor. Letters from the Reliance Mine, Keweenaw Point, give very flattering accounts of the prospects of that property, and orders are received here for liberal purchases of the stock.—*New York Commercial Advertiser, June* 24.

We met the Transfer Agent of the Reliance on the street on Thursday, wearing a smiling countenance, and carrying in his hand several pieces of stamp stuff full of copper, taken from a vein on the Reliance location. He also had a piece of float copper found on the Reliance estate.—*U. S. R. R. & Mining Rep. July* 2.

Gould & Curry Improvements.—The Gould & Curry Company are about to change the process of reduction in their mill from the dry to the wet method. The dry mode is very hard on the lungs of the workmen and is no more economical than the wet plan. They are now engaged in the erection of six large patio platforms, to be used in working the tailings from the mill. The amalgamation will be effected in the patios without the aid of the wooden wheels commonly used, a number of Mexican mustangs having been procured to be used in treading the pulp. This plan of working silver ore is practiced in Mexico, but is very hard on the poor animals, as, owing to the chemicals used in the pulp, their legs are liable to become very sore, and the mercury in the mass is also injurious to their health.—*Nev. Ter. Ent., May* 28.

Coal on the West Side of the Susquehanna Through the Whole Valley of Wyoming.—The *Luzerne Union* says: "The West Pittston Coal Company have just struck at a distance of 185 feet from the surface, a 7½ foot vein of coal; 5½ feet of which is very pure and of a very superior quality. This proves the existence of good and profitable working veins of coal on the west side of the river through the whole valley—a question which has been a matter of doubt with many who considered themselves entitled to be authority upon the subject."

Mining in Lake Superior.—The report of the Central Copper Mine, for the year ending December, is of a satisfactory character, and it is estimated that the yield would have been nearly double that of the former year had it not been for the misfortune of losing the engine and shaft-house at No. 2 shaft by fire, together with 300 feet of the tramway, and some injury done to the pumping-machinery, all of which was equivalent to three months delay; mechanics were so scarce at that time it was impossible to procure one-fourth the number required. The average number of miners employed for the year was 93. On Dec. 31, they had 124 miners, 11 mechanics and engine-men, and 68 laborers, at mine, surface, and stamps, making, with mining captain and clerks, 207 men employed by the company. Upwards of 400 tons (English) of copper were raised and prepared for shipment during the year.

Enterprise in California.—The Washoe *Weekly Star* states that in Humboldt District, a Company is constructing a canal sixty-three miles in length, five feet deep and sixteen feet wide, to lead the waters of Humboldt river to the mining sections of the different districts. This canal will give water power for any number of quartz mills. A city has been located by a company on both sides of the canal, in the richest section of the country, where mills are to be built, and it is claimed that this will be the centre of business in Humboldt country.

Props and Supports for Mines.—The London *Mining Journal* says: "The use of props and cross pieces in pits and mines is for the purpose of supporting the roof or strata overlying the coal, and preventing them falling into the open space after the coal or other mineral has been wrought. In the working of coal and other mines, props of timber and cast-iron and cross-pieces of timber have been used; but when the weight of the roof rests upon cast-iron props they become brittle and liable to fracture. The timber props and cross-pieces are not in all cases adequate to support the pressure of the roof, and break or bend below the weight, thus causing a loss of material. Both timber and cast-iron props have a tendency to sink into the bottom or floor of the mine; their utility is thus lessened or destroyed, and the great size and weight of cast-iron props cause their use to be most expensive. The pressure to which cross-pieces are subject renders it necessary that the timber employed in their construction should be of considerable thickness, and this injuriously lessens the height of the galleries in the mine. To obviate these difficulties, Mr. George Elliott, of Betley Hall, Stafford, has patented an invention, which consists in making both props and cross-pieces of wrought or malleable iron, whereby greater strength is obtained, less expense incurred, and more room is gained for the galleries of the mine. The wrought or malleable iron props may be solid or hollow, and of any convenient shape, but he prefers to form them with a section of three ribs, equidistant, springing from a centre, or four ribs, forming a cross. He also proposes to employ shoes of metal or wood to support the props, and to interpose similar blocks between the top of the props and the horizontal cross-piece. Other parts of the invention in forming the horizontal cross-piece, with its two ends bent at right angles, or nearly so, in order to grasp the interposed blocks or top-pieces on the said props, and prevent their coming loose owing to the deflection of the horizontal cross-piece. Mr. Elliott also claims the use of horizontal cross-pieces, or bars of wrought or malleable iron, with or without the use of shoes or top-pieces, in connection with props or uprights, of whatever material composed, and the use of shoes or footings for the reception and support of such props or uprights, of whatever material composed.

Valuable Copper Mine.—The copper mine known as the Great Devon Consols, located in Devonshire, England, is one of the most valuable mines in the British empire. Since it was first opened—at a comparatively recent date—its gross yield has been not less than $10,000,000. About one-half of this amount has been paid out in dividends and lord's dues. The mine is now in the height of its prosperity, and its annual net yield is set down at about $275,000, about $50,000 of which goes to the Duke of Bedford, as lord's dues. The copper mines of Devonshire are all found in slate, not one having hitherto been found in granite. The ore which predominates is the yellow sulphuret, which, when roasted, brings an average price of about $25 per ton. The Burra Burra copper mine, in Australia, is also one of great value, though not as yet fully developed. When first opened, this mine for a while paid back to its stockholders the entire amount of its paid up capital every six weeks.

The Golden Age and Empire.—This is one of the most promising mines in Esmeralda, and is situated on Last Chance Hill. The two companies, the Golden Age and the Empire, were first located in 1860. They were consolidated in March last. About 1,000 tons of rock were taken out and crushed in 1860 and 1861, yielding at paying rates. The present Superintendent, Mr. Benson, went to work with a few men last December, and in about two months sent down $5,000. A subsequent crushing of 214 tons yielded $35,500, which was received in this city some three or four weeks since. One dividend, of $5 to the foot, has already been paid, and the funds are now in hand for the second. Three dollars per foot is the total amount of assessments levied by this company, only one dollar of which has been made since the consolidation. The mine has recently been examined by Professor Silliman, who speaks well of it. The deepest shaft yet sunk is 140 feet. Better rock is confidently expected at a lower point. The company is now taking out rock which is being crushed, from which another remittance will soon be received.—*San Francisco Mining Press.*

Improvement in Stamp Letters.—Mr. Hodge, of Detroit, Michigan, has introduced what appears to be a decided improvement in the manner of lifting stamps. By this invention the heads, instead of being always lifted to a constant height, are lifted to heights variable with the accumulation of ore in the mortar. For instance, if a stamp, when standing upon the bottom of the mortar, is lifted a distance of six inches, and before being allowed to fall a block of four inches thickness is placed beneath it; the next revolution of the cam shaft will raise that stamp to a distance of ten inches; and thus the stamp will constantly have the same fall upon the quartz to be acted upon, whether the accumulation in the mortar be more or less. The device for accomplishing this is very simple. We shall give an illustration of it, by which the same shall be made perfectly plain to every reader.

Pulverizing and Mixing Iron Ores, Fluxes, and Fuel previous to Smelting.—A patent has been granted to Mr. John Thomas, of Batterse, for improvements in treating ores, which consists in pulverizing the matters to be operated on, if not already pulverized, and then mixing them with the following ingredients, in the proportions named: Sand, or ores reduced to a state of sand, two parts; clay, two parts; chalk, one part; coal, or other fuel, one quarter part. These proportions may, however, be varied according to the quality of the ore, but they must be such that a brick may be formed of the materials used. After they have been well mixed and amalgamated, they are to be formed into blocks or lumps, and then dried or calcined by burning, care being taken during the burning to prevent contact with the air. After calcination the mass is ready for reducing in the manner ordinarily followed in smelting iron ores.

MARIPOSA COMPANY.—The San Francisco *Mining Press* says: The Mariposa Company, lately formed in New York, have purchased the interest of Mark Brumagim and Treinor W. Park in the estate known as "Las Mariposas," or, in plain English, "The Butterflies," and as some names now prominently before our readers will appear during the recital, we consider this as good an opportunity as any to give a brief history of "Las Mariposas." This celebrated tract of land was originally owned under a grant from the Mexican Government to Juan B. Alvarado, and was by him sold to John C. Fremont, and after a time resold under a judgment recovered by Francisco A. Campo against J. C. Fremont and other parties, through which sale the interest of Messrs. Brumagin and Garrison in the estate came, and finall passed into the hands of "The Mariposa Company," which company (organized and incorporated under the laws of the State of New York) either forgetting or being wilfully blind to, entirely ignored the claims of Messrs. Brumagim & Garrison; but these gentlemen, not being blind to their own interests, or forgetful of their claims for moneys actually advanced to Messrs. J. C. Fremont and T. W. Park, offered to the new company a chance to purchase from them all their interest in "Las Mariposas" for the sum of (in round figures) $175,000. This offer the company indignantly refused; and as Messrs. Brumagim & Garrison were cool, clear-headed business men, they immediately proceeded to commence operations to enforce their claim; and, having first obtained an extensive and thorough abstract of their title, proceeded to institute legal proceedings for the sums advanced, and interest thereon. The New York Company, finding that they had found parties who would not be scared, and believing that discretion was the better part of valor, offered, like Captain Scott's celebrated coon, to "come down," and were finally allowed to do so to the amount of $350,000 in gold coin. The result is gratifying all round, as the sellers are amply recompensed, and at last the Mariposa Company of New York have obtained an absolutely perfect title to the grant whose name heads this article.

GOLD ON LAKE SUPERIOR.—The reports of rich gold deposits on Lake Superior, long deemed fabulous, appear to be in a very fair way to full confirmation. Letters state that there can be no doubt of the existence of valuable gold deposits in and around the Huron Mountains. Preparations have been made for a thorough exploration. The Houghton *Mining Gazette* has the following editorial paragraph, the editor having just returned from the district where the gold veins are said to exist: "The discoveries in gold bid fair to eclipse by far the most sanguine expectations ever formed of the silver lead. At first, the analysis showed an amount of gold in the pyrites of iron, equal to from sixty to one hundred dollars per ton of ore. Other samples have been obtained within the past three weeks, which, upon analysis, have, to the astonishment of everybody, yielded as many, and in some cases more, ounces of gold than it had before shown dollars' worth.

These analyses have of late shown one pound of gold per one hundred pounds of clean ore, and one of them made by Mr. Williams this week has shown *thirty-two pounds* per ton, and had he the facilities to make a complete analysis, it would have shown a small amount more. Large entries of land have been made in and around the Huron Mountains, and we hear that 13,000 acres of land were taken up last week. But little more land has been left for entry in that section, we should think, and another field must be found for operations.

RICH PAY DIRT.—The Placerville *News* says that a day or two since Frank Goyan took a pan full of dirt from his claim, which, on being panned out, yielded sixty dollars. The claim is the old Wells, or H. A. P., on Cedar Hill, and was given up several years ago as worthless. It now belongs to Goyan and Dickerhoff. The tunnel is about 1,000 feet, and several pans have been taken out recently that yielded over an ounce of gold each.

SOMETHING OF A DEPTH.—The Gould & Curry Mining Company intend having a forty-horse power steam engine set up in their mine, over four hundred feet below the surface of the earth. It is to be placed there to hoist water and ore from even a still lower depth.

AGES OF STONE AND BRONZE.—The attempts of the Swiss geologists and archæologists to estimate definitely in years the antiquity of the bronze and stone periods, although as yet confessedly imperfect, deserve notice, and appear to me to be full of promise. The most elaborate calculation is that made by M. Marlot, respecting the delta of the Tiniere, a torrent which flows into the Lake of Geneva near Villenenve. This small delta, to which the stream is annually making additions, is composed of gravel and sand. Its shape is that of a flattened cone, and its internal structure has of late been laid open to view in a railway cutting 1,000 feet long and 32 feet deep. The regularity of its structure throughout implies that it has been formed very gradually, and by the uniform action of the same causes. Three layers of vegetable soil, each of which must at one time have formed the surface of the cone, were cut through at different depths. The first of these was traced over a surface of 15,000 square feet, having an average thickness of 5 inches, and being about four feet below the present surface of the cone. The upper layer belonged to the Roman period, and contained Roman titles and a coin. The second layer, followed over a surface of 25,000 square feet, was six inches thick, and lay at a depth of ten feet. In it were found fragments of unvarnished pottery and a pair of tweezers in bronze, indicating the bronze epoch. The third layer, followed for 3,500 square feet, was six or seven inches thick, and nineteen feet deep. In it were fragments of rude pottery, pieces of charcoal, broken bones, and a human skeleton having a small, round, and very thick skull. M. Morlot, assuming the Roman period to represent an antiquity of from sixteen to eighteen centuries, assigns to the bronze age a date of between 3,000 and 4,000 years, and to the oldest layer that of the stone period, an age of from 5,000 to 7,000 years.—*The Geological Evidence of the Antiquity of Man, by Charles Lyell.*

SILVER IN BUENOS AYRES.—In the Argentine Republic, province of San Juan, and at the foot of the Andes, 700 miles distant from Buenos Ayres, a rich silver-bearing region of immense extent has recently been discovered. An area of 100 miles by forty has already been prospected, and, wherever worked, a yield rarely surpassed in quantity and quality by any other district has rewarded the adventurers, whose labors are facilitated by smelting works, with the best English machinery, being already erected on the spot for the reduction and refining of the silver.

MINING REVIEW.

New York, 1864.

Since our last report operations at the Mining Board have been limited, and at generally lower prices.

The stringency in the money market has more effect on the speculative mining shares than on railways, as there is greater difficulty in borrowing on this class of collateral.

In Copper there has been more inquiry for a few of the producing mines, based on the large advance in ingot, which has sold as high as 58c.

In our last issue we called attention to the Quincy Company, showing that, with an increased product, and a large advance in price of the metal, the stock had only improved some 2 per cent. since January. Within the week the stock has sold at 108, showing our advice to have been sound.

Central is strong, and the decline caused by loss of Stamp Mill nearly recovered. Evergreen Bluff is inquired after at better figures; holders feel confident that, with present prices and product, they will receive a dividend within a twelvemonth. Minesota again lower; offered at 37.

Non-producing stocks are dull, and lower. The large advance in labor and material promise heavy assessments before the mines will become self-supporting, and investors prefer those mines which have already their machinery on the ground, even at much higher prices than the new ventures are offered at.

Gold stocks have been neglected, and the few sales reported are at lower rates. Quite a number of the Colorado Companies, lately placed on the market, are paying monthly dividends, and others advise that they only await the arrival of machines before taking their place on the list.

Lead stocks show better change, with limited transactions.

The Placentia Bay Company are in receipt of a cargo of ore, and have advices from the mine of an average product of a ton per day.

PHOTO-SCULPTURE.

An ingenious application of phlography has been recently made in Paris, to which the name of photo-sculpture has been applied by M. Willeme, its inventor. By this process busts and statutes of living persons are prepared in plaster and "biscuit," which possess much of that faithfulness and minute accuracy of detail which are so striking in photographic portraits. The principle of the new art is easily explained. The person whose bust or statue is to be taken is placed in the centre of a circular apartment 40 feet in diameter, and 24 cameræ obscuræ are placed along the wall at equal distances from him and from each other. By means of a latch which raises and drops the slides at the same moment, 24 photographs are taken at the same instant of the sitter. He is thus represented from 24 points of view. There are of course six front views, six back views, and 12 side views, so that a clever artist would find in these photographs all the materials for a piece of sculpture to be fashioned by the eye. But this is not the course taken, mechanical processes being adopted which insure much greater accuracy. The negative of one of the portraits is placed in a magic lantern, and the image printed upon it is projected on a large sheet of rough glass. The block of clay in which the model is to be cut is then placed on a revolving stand, the circumference of which is divided into 24 parts. A pantograph is next employed by which the clay is cut exactly to represent the outline on the glass. When one photograph has been copied the image of the next is placed in the lantern, and the clay is turned round 1-24th part of a circle. It is then copied, and so on with the 24 negatives. The result is that the block of clay exhibits 24 sides, or facets, representing exactly the outlines of the 24 photographs. Of course there are ridges left which must be smoothed down, and this process is intrusted to skilful artists. The latter stages of the process are not yet introduced in this country, but photographs are now taken by M. Claudet, of Regent street, who sends them to Paris in order that figures may be prepared from them. M. Claudet has now on exhibition at his gallery in Regent street a large collection of full-sized medallions, small busts, and statuettes, prepared in this way, a single glance at which will show that effects are produced by the new art altogether different in kind from those arrived at by the methods of the sculptors, and that in short the figures prepared by this process possess some of the best qualities of photographs. We should imagine that this beautiful process could be applied to the production of patterns for metal-work.—*Ironmonger.*

HOW TO PREVENT WET FEET.—A writer in the *Mechanics' Magazine*, says: "I have had three pairs of boots for the last six years, and I think I will not require any more for the next six years to come. The reason is that I treat them in the following manner: I put a pound each of tallow and resin in a pot on the fire; when melted and mixed, apply it hot with a painter's brush until neither the sole nor upper will soak any more. If it is desired that the boots should immediately take a polish, dissolve an ounce of wax in a teaspoonful of turpentine and lampblack. A day or two after the boots have been treated with the resin and tallow, rub over them this wax and turpentine, but not before the fire. Thus the exterior will have a coat of wax alone and shine like a mirror. Tallow and grease become rancid, and rot the stitching or leather; but the resin gives it antiseptic quality, which preserves the whole. Boots or shoes should be so large as to admit of wearing cork soles. Cork is so bad a conductor of heat that with it in the boots the feet are always warm on the coldest stone floor."

FROM IDAHO.—The Humbolt *Register* says that quite a number of persons have returned to Star city from Boise River and Jordan Creek. They do not give a very flattering account of that region as a mining country.

VISIT TO THE GOULD AND CURRY WASHOE SILVER MINE.—In company with Mr. Charles Pope, the actor, we yesterday took a look through the Gould & Curry mine. We found that quite a number of improvements had been made in the mine since our last visit, which, by the way, was in company with Artemus Ward, of "wax figger" celebriyt. The first improvement noted by us was a spiral staircase, reaching down through what is called the old works, from the first floor. This staircase was built by Mr. Strong, just before he left, and was about his last work in the mine previous to his being elevated to the presidency of the company. It is a very convenient means of descent for ladies visiting the mine; in fact, it is convenient for anybody, male or female, though constantly turning round in one direction, and in a small circle, causes a slight degree of giddiness. Our guide informed us that he conducted Miss Hardinge through the mine not long since, and said she was "awful tickled" with what she saw, and "not one bit afraid" of the roaring terrors of this underground Babel. During our underground travels, and when down some two hundred feet, we were agreeably surprised by meeting with Mr. Gillig, of the firm of Gillig, Mott & Co., hardware merchants of this city wandering, candle in hand, through the subterranean galleries. Some friends from California were with him, taking a look at the underground wonders of Washoe. As we were all going one way, our two parties joined, and in a body explored the balance of the mine—the deeper regions. We were now a large party, and, as each man carried a candle, made quite a respectable torch-light procession. We saw hundreds of strange faces during our underground travels and everywhere found workmen delving in the rich silver ores for which the mine is so famous. In one place the workmen were digging out some beautiful specimens of ore covered with shining scales of native silver; in other places we found heaps of the rich black ore, which is sent to England for reduction, and everywhere immense quantities of second and third-class ores, as much as they can possibly work in the mills of the Territory. Over 400 feet below the surface, we came upon a huge chamber in the rock, which is being hollowed out as a site for an engine-house. In this, within six weeks, a forty-horse power engine will be hissing and tugging at hoisting and pumping from the new galleries shortly to be opened one or two hundred feet below. Two large shafts have been commenced in the floor of the lowest level—430 feet below the surface—which are intended to penetrate to a sufficient depth on the lead for the opening of a series of galleries far below the lowest work that has yet been done in the mine. These shafts are now each down some fifteen feet, and a strong force of men are at work, pushing them down toward the centre of the earth. Both are some twelve feet six in size, and both are being substantially timbered as they are carried down. There is already a considerable influx of water, but the workmen are able, by bailing, to keep the shafts sufficiently dry to continue with the work of sinking. Judging from present appearances, pumps will be needed to drain these shafts before they are sixty feet in depth. After examining the works on the lead we passed out through what is known as the Lower Tunnel, a walk of near half a mile, watching our opportunity to pass out without interfering with the trains passing in and out. Three trains of cars are used, there being about eight cars in each train. The cars run on without pushing by carmen, the grade of the tunnel being pretty steep. Since our last visit to the mine, the tunnel and track leading out through it have been much improved. The tunnel has been most substantially timbered, and the track for the cars newly laid upon large and solid ties. There is no better track in the Territory, nor one better planned. At the mouth of the tunnel we found the usual number of carpenters and blacksmiths at work in their respective shops, with teams loading at the ore bins, and all the bustle incident to the carrying on of a big institution, such as the Gould & Curry certainly is. We also discovered that quite a heavy shower of rain was falling in the outer world, something we had not even dreamed of, and something not very agreeable to the majority of our party, as they had left their coats at the upper tunnel, nearly half a mile above, in the city. During our trip in the mine we encountered two other parties, composed of men unknown to us, wandering the dark profound, in search of the wonderful. In conclusion, we will say—though it appears rather superfluous—that all who visited the mine were astonished and delighted at what they beheld of Washoe underground.—*Nevada Ter. Enterprise, June 4.*

WATER.

REPORT OF THE WATER REGISTRAR OF THE CORPORATION OF WASHINGTON.

WATER REGISTRAR'S OFFICE,
WASHINGTON, D. C., March 1, 1864.

Hon. RICHARD WALLACH, Mayor:

Sir,—I have the honor to submit, in this report, an exhibit of the present condition of our water distribution and of our operations, year by year, from the organization of the Water Department to the beginning of the current year.

The books were opened in this office, for the first time, on the 11th day of July, 1859. At that date the only water mains in the city available for general use were: the twelve-inch main laid by the United States Washington Aqueduct from Georgetown *via* Pennsylvania avenue and Eighth street East to the Navy Yard; the twelve-inch main from Pennsylvania avenue up Eighth street to North F street, and along F to Seventh street; the twelve-inch main from Pennsylvania avenue up Four-and-a-half street to North D street; the twelve-inch main from Pennsylvania avenue down Twenty-fourth street West to the United States Observatory; the four-inch main from Pennsylvania avenue down Seventeenth street to the War-office, and the following six-inch mains, which, by special permission of the corporate authorities, had been laid in advance of our organization, subject, by special arrangement, to be purchased by the Corporation, viz.: In Sixteen-and-a-half street from Pennsylvania avenue to H street, and thence in Connecticut avenue to I street, and thence in I street to the outlet of the alley in square No. 200; in Fifteenth street West from New York avenue to I street; in H street North from Fourteenth to Fifteen-and-a-half West; and in North G street from Twenty-fourth street to the Gas-light Company's works east of Twenty-sixth street West, a three-inch main.

The following table shows the number of lineal feet of water-mains laid by the Corporation in each year from 1859 to 1863, inclusive, and the total length of mains owned by the Corporation at the close of each year.

[In the quantities for 1859, the mains laid by other parties, under special permits, and afterwards purchased by the Corporation, are included.]

	Laid during the year.			Total at close of the year.		
	6-inch.	4-inch.	3-inch.	6-inch.	4-inch.	3-inch.
In 1859...	16,227	200	1,100	16,227	200	1,100
In 1860...	79,068	1,312	....	95,295	1,512	1,100
In 1861...	6,437	537	....	101,732	2,049	1,100
In 1862...	1,532	1,253	....	103,264	3,302	1,100
In 1863...	15,539	3,142	....	118,803	6,444	1,100

During the year 1859, the United States Washington Aqueduct extended their main, partly of twelve and partly of ten-inch diameter, along Seventh street West from F street to North Market Space; and during the year 1860 they laid their great thirty-inch main *via* Pennsylvania avenue, K street, Massachusetts avenue, and New Jersey avenue, connecting there with the twelve-inch main in North A street, and connecting at Seventh street West with the ten-inch main laid in 1859. In the same year, 1860, the United States Washington Aqueduct likewise laid a twenty-inch main, connecting with their thirty-inch main in New Jersey avenue near North B street, thence crossing the public reservation north of the present Capitol grounds, Pennsylvania avenue (connecting with the twelve inch main) the public reservation known as the "Botanical Garden," to the line of Maine avenue, along Main avenue to Sixth street West (connecting at Four-and-a-half street with the twelve-inch main previously laid in that street from Maine avenue to South T street, and by connection with the twenty-inch main made available) along Sixth street West to South B street, and along that street to Tenth street West.

The total extent of water mains laid within the city, by the "Washington Aqueduct" and the Corporation of Washington, up to the end of the year 1863, to be:

Of thirty-inch main	15,753	feet.
Of twenty-inch main	5,111	"
Of twelve-inch main	39,167	"
Of ten-inch main	905	"
Of six-inch main	118,803	"
Of four-inch main	6,984	"
Of three-inch main	1,100	"
Total	187,823	feet.

In laying the Corporation mains, the rule has been invariable to place branches for connection wherever the plan of the city indicated that a water-main might at any future time be required, and always lines crossing each other have been connected, insuring the greatest possible circulation in the pipes. In the United States mains the rule, generally, was to leave outlets for connection of lateral mains.

After trial of almost everything in the shape of fire-plug that has been presented for our acceptance, we may at last congratulate ourselves upon having secured that which, for ease and simplicity of operation, for facility of connecting and disconnecting, for volume of discharge, and for excellence of mechanical workmanship, is the best. The machine-shops of our own city, the establishments of the Messrs. Ellis and of John McClelland, have invariably, from the beginning of our water distribution, given us much better and cheaper work than we have procured anywhere else. The fire-plug which is spoken of above as *best* was designed by Mr. McClelland, and is made in his establishment. Forty of them have been made and delivered, in execution of one contract, and one hundred are in hand, well advanced, in pursuance of a second contract. Under an act of the Corporation, approved January 2, 1864, the Water Registrar and the Chief Engineer of the Fire Department have determined the localities at which the forty fire-plugs on hand shall be placed, and the necessary orders have been given which will insure their erection immediately, whenever the weather will permit the opening of the streets.

With reference to the one hundred fire-plugs now in the workshop, I beg leave respectfully to recommend that the Water Registrar be authorized and directed to use them, as fast as delivered, at all points contiguous to improved property where the underground fire-plugs now are, and that all further use of the underground fire-plugs be strictly forbidden. The difficulty of access to them, and of connecting hose to them in freezing weather, or in wet weather, when the streets are muddy, or in the darkness of night, is so great as to impair their usefulness. No doubt much of this difficulty would disappear if the cool and steady discipline of a force of paid firemen could be substituted for the eager and impetuous hurry of volunteers; but, even if it could be entirely removed, the serious objection would remain—that the valves which regulate and stop the water-pipes are liable to be used by others than officers of the Water Department. These four-way fire-plug stop-cocks are the best stops we have, and the cheapest, for each does the work of four. Let them, I earnestly recommend, be used for that purpose alone, and by the water officers only, and let the Fire Department take exclusive charge of all fire-plugs immediately after they shall have been fixed in place. This suggestion, if adopted, will obviate the necessity of raising such of these four-way plugs as have been buried by the recent "improvements" of the streets, and will be very little more costly than that operation would be if executed in accordance with a recent act of the Corporation—"by placing the McClelland improvement on them."

The receipts and expenditures for the last five years are as follows:

YEARS ENDING.	RECEIPTS.	EXPENDITS.
December 31, 1859	$25,835 39	$24,566 72
December 31, 1860	84,344 46	84,551 70
December 31, 1861	17,889 86	18,550 73
December 31, 1862	13,382 02	11,641 15
December 31, 1863	81,021 65	29,006 10
Total	$171,973 98	$168,286 40
	168,286 40	
Balance to credit of Water Fund, December 31, 1863	$3,687 58	

The total area of Washington, computed by me heretofore, with reference to another subject, is 266,192,546 square feet, equivalent to 6,110.94 acres, which is thus divided:

Public Reservations	25,189,002	square feet.
Building Ground...	121,095,214	do.
Alleys	7,141,105	do.
Streets, Avenues, Open Spaces and Canal.....	112,767,225	do.
Total as above.....	266,192,546	do.

From the above figures we have the following results:

The proportion of the area of the building ground in the city to the length of the streets and avenues is as 100.6 to 1.

The proportion of the area of the building ground to the length of building frontage is as 76.9 to 1.

The proportion of the area of the streets, avenues, alleys, open spaces, and canal, to the length of the streets and avenues, is as 99.6 to 1.

The proportion of the area of the streets, avenues, alleys, open spaces, and canal, to the length of the building frontage is as 76.2 to 1.

The proportion of the area of the building ground to the area of the streets, avenues, open spaces, and canal, is as 100 to 99.

The proportion of the length of the streets and avenues to the length of the building frontage is as 100 to 130.75.

We have here the data for an estimate of the cost of water distribution throughout the whole city, provided we assume some size of water-main as the average for all the streets and avenues.

Heretofore we have taken six-inch mains as the average, which, including the great mains laid by the General Government, is sufficient, and have estimated the cost at one dollar per foot, which was the fair fair specie cost. Assuming one dollar, or any other sum per foot, as the cost, we ascertain exactly what charge the total amount constitutes per square foot on all the building ground or per front foot on all the frontage. But when we come to make discriminations as to lots with two or three, or more, fronts, we drift away into mere uncertain guess-work, and are liable to tax either excessively or insufficiently. Yet if a front foot tax is imposed, there must be discrimination in favor of such lots, for the obvious reason that a frontage of two feet on a water-main will secure to the lot all the water benefits it could require, and a frontage of a hundred feet could secure no more. A frontage tax may be as "nearly as possible equal and uniform," but the square foot tax is "equal and uniform" exactly. Our neighbors of Georgetown tried the frontage tax, and are in trouble to this day, though they have had the benefits of two Acts of Congress to extricate them.

Very respectfully, your obedient servant,

RANDOLPH COYLE,
Water Registrar.

WATER SUPPLY TO PARIS.—M. Dumas has lately communicated some remarks of his own on supplying Paris with water from the Seine, embodying them in four propositions, viz.: 1. That water should not be taken below Paris. 2. That a preference should be given to that taken above. 3. That all organic matter mixed with the waters of a river are very slowly decomposed; and 4. That a separation should be effected between the waters intended for drink and those which are destined to scour the streets and sewers. Paris must cease throwing all its refuse into the Seine; the sewers must be discharged into the fields, in the direction of Gennevilliers and elsewhere; the irrigable surface is large, and the soil will admit of every kind of cultivation by the manure it thus receives. Everywhere running streams should be protected from all mixture with organic matter, and everywhere these noxious substances should be collected and rendered beneficial, by applying them to purposes of agriculture. With sea-water, the case is quite different. Venice, with her population of nearly 200,000 souls, may with impunity pour the contents of her sewers into the lagoons, while the sewers of London, in course of time, rendered the stench of the Thames intolerable, and the waters of the Seine would have been reduced to the same condition had not timely precautions been taken. M. Dumas has adverted also to another important point in hygienics—the ventilation of crowded places, a problem which he now considered to be satisfactorily settled.

A WATER ENGINE—A CALIFORNIA INVENTION.—Mr. Thomas Hardsbrow, the inventor of the "Challenge Pump," which took the gold medal at the World's Fair in London, has just completed another very important invention, which is spoken of as follows by the Sacramento *Bee*:

The invention is embodied in the form of a hydrostatic engine—run entirely by the pressure (not volume) of water—works cold water as an expansive agent, and does it most admirably. Messrs. Hansbrow and Redding intend having one constructed for practical exhibition of its workings at the Fair of the San Francisco Mechanics' Institute, to be held in September next. They have now a small tin model running at the store of Mr. Hansbrow, on K street, between Second and Third streets, which, though rudely constructed, exhibits the power of the engine, it being a man's work to stop the motion. It will supersede steam wherever a pressure of water can be obtained. In this respect it will be especially serviceable and invaluable throughout the mining regions of California and the Pacific coast, as well as in our cities where there is a supply of water from public works. The inventors intend building the engines immediately, and introducing them into use. Intelligent mechanics who have examined the rough model unite in pronouncing it the greatest invention of the age, the sewing-machine not excepted; and like all great inventions, it is simplicity itself.

WATERWORKS IN WATERFORD, N. Y..—Several of the leading citizens of Waterford are considering the feasibility of constructing a reservoir northeast of that village, for the purpose of securing an abundance of water, and for more perfect security against fire. The project is one that is deserving of the support of all.

PETROLEUM REVIEW—1ST TO 15TH JULY.

NEW YORK, July 14, 1864.

Crude.—The market has been firm, and rising until the last two days, when in consequence of the tightness of the money market, and the gradual falling off of gold, the market has showed considerable weakness. The last made were at these figures: 1,000 bbls. 40° to 45° gravity, at 58 cents; 1,500 bbls. 40° to 47° gravity, at 57 cents; 500 bbls. 40° to 49° gravity, at 57 cents; also 1,500 bbls. b. o., this month, at 57 cents. In the absence of sales, it may be quoted to-day at 55 cents for 40° to 47° gravity.

Refined—In bond, is without much demand; and it partakes also of the depression of the general market. I notice the following sales: 1,500 white, at 93 cents; 1,000 prime light straw to white, at 91 cents; 750 bbls. light straw, at 88 cents; and 300 bbls. straw, at 83 cents. The oil is dull, and may be quoted at 93 to 98 cents, according to quality. The consumptive demand is very light.

Benzole is dull at 43 to 45 cents, according to quality.

Remarks.—The market has not been an active one since the "4th," although prices have not been well sustained, but at the close, I notice decided weakness in prices. Gold is falling, and the money market is very tight. It seems to me, however, impossible that oil should return to anything like former prices. As about two-thirds of the oil that comes to our market is exported, gold and exchange must regulate the price of bonded oil. Free oil of necessity will keep above bonded—thus having free and bonded oil regulated, crude must keep in proportion. The price of exchange also acts directly on crude. Will gold go down?

The arrivals are by Erie Railway, 21,587 bbls.; by C. & A. R. R., 1,620 bbls. Total, 23,207 bbls.

The exports for past fifteen days, are 472,617 gallons; and since January, 7,954,628 gallons.

B. L. HARSELL,
Commission Merchant,
132 & 134 Maiden Lane.

Twelve miles of the piping of the Dublin Waterworks are completed.

The area of the Dublin Waterworks' shed is 420 acres.

TESTING OILS BY THEIR COHESIVE FIGURES.—Chemistry having failed to detect some admixtures af oils, C. Tomlinson has had recourse to a physical test, doubtless suggested by the researches of Savart, which he described before the London Pharmaceutical meeting of last month. The test depended upon the forces of cohesion, adhesion, and diffusion. A drop of the liquid to be tested was carefully dropped upon chemically pure water in a chemically clean vessel. The force of adhesion endeavored to spread the oil in a thin film over the surface of the water, the force of cohesion endeavored to prevent this, and from the contest of these two forces there resulted figures which the author believed to differ in the case of every independent liquid. There might be instances of two or more liquids differing in chemical composition, but having the same physical properties, where the figures would be identical. Such cases, however, must be rare. The oil must be dropped from a rod that has been made perfectly clean by being washed with strong sulphuric acid, rinsed in water, then washed with caustic potash, and again rinsed with water. The rod should be held only about one-tenth of an inch from the water when the oil is dropped.

The figure produced by castor-oil is of great beauty. As soon as this oil is dropped it spreads out in a series of rings, magnificently iridescent. Outside there is a silver corona, which breaks up into a delicate lace like pattern; this appearance lasts for some seconds. The figures of the fixed oils are more durable. Mixtures could be easily detected as the figures produced partook of the characters of both the constituent oils, yet resembling the proper figure of the oil which is in excess. A mixture of lard oil is best shown in what may be called the residual phenomena, the lace-like patterns being scattered over with numerous small blotches. Croton oil gives a magnificent figure of large pattern, and a mixture of five per cent. of this oil with castor oil may be readily detected by the practiced eye. Turpentine gives a remarkable figure; the film flushes out immediately almost to the edge of the vessel; the outer circumference is dotted with numerous small bosses, which are larger within, and enclose patches of irisdescent colors. The figure produced by balsam copaiba was a magnificent sight. A succession of rings were thrown out, showing beautiful colors and a metallic luster. A mixture of balsam and castor oil gives neither colors nor pattern.

BURIED FORESTS.—Extensive forests, covering vallies and hill-sides, are overturned, and the uprooted trees form a gigantic barrier which prevents the flowing off of the waters. An extensive marsh is formed, particularly well adapted for the various kinds of mosses. As they perish, they are succeeded by others; and so for generations, in unceasing life and labor, until in the course of time the bottom, under the influence of decay and the pressure from above, becomes turf. Far below lies hard coal; the upper part is light and spongy. At various depths, but sometimes as much as twenty feet below the surface, an abundance of bogwood is found, consisting mostly of oak, hard and black as ebony, or of the rich chocolate-colored wood of the yew. Such ancient forests every now and then rise in awe-inspiring majesty from their graves. The city of Hamburg, its harbor and the broad tracts of land around it, rest upon a sunken forest, which is now buried at an immense depth below the surface. It contains mostly limes and oaks, but must also have abounded with hazel woods, for thousands of hazel nuts are brought to light by every excavation, not exactly made for nuts. The city of New Orleans, it has been recently discovered, is built upon the most magnificent foundation on which a city ever rose. It was the the boast of Venice that her marble palaces rested in the waters of the Adriatic on piles of costly wood, which now serve to pay the debts of her degenerate sons; but our Venice has not less than three tiers of gigantic trees beneath it They all stand upright, one upon another, with their roots spread out as they grew; and the eminent Sir Charles Lyell expresses his belief that it must have taken at least eighteen hundred years to fill up the chasm, since one tier had to rot away to a level with the bottom of the swamp before the upper could grow upon it.

GAS.

DR. LETHEBY'S LECTURE ON THE CHEMISTRY OF GAS LIGHTING.

We take the following from the *London Sanitary Reporter*, which says, that:—

"Although the lecture, as a whole, contains a curiously hashed up dish of chemical results, arrived at by other chemists, there are a few points in it which are original, and are worthy of attention, from their important bearing on the manufacture of gas. For instance, the effect of distilling moist or damp coals was forcibly pointed out. The lecturer explained, when moisture was being distilled from the interior of a charge, and came into contact with the protosulphide of iron, a double decomposition took place, the oyygen of the steam combining with the iron to form oxide of iron; and the hydrogen combining with the sulphur to form sulphuretted hydrogen; which, of course, greatly added to the cost of purification.

The action of heat in the distillation of coal was traced through a series of combinations which took place amongst the disturbed elements.

Thus, after the displacement of the moisture, up to about 700° Fah., oxygen was probably the first of the combined gases to be displaced. The oxygen combined with hydrogen to form water, with carbon to form carbonic acid, and with both carbon and hydrogen to form spirituous compounds, rich in oxygen, and capable of mixing with water. At a somewhat greater heat, namely, about 980°, which is a red heat just visible in the dark, the hydrogen combines with carbon to form those solid and liquid hydrocarbons of the nature of paraffin, paraffin oil, and benzole, which are not capable of mixing with water. At 1,500°, which is a cherry red heat, gas of high illuminating power is copiously produced. At this temperature, also, the sulphur combines with hydrogen to form sulphuretted hydrogen, thp nitrogen combines with hydrogen to form ammonia, and with carbon to form cyanogen. At a full red heat of 1,800°, and from this to an incipient white heat, permanent gases of low illuminating power, as carbonic oxide, marsh gas, hydrogen, bisulphide of carbon, and other injurious sulphur compounds, are freely evolved. The lecturer considers a cherry-red, or 1,500°, the best temperature for distilling common coals, and a full red, or 1,800°, the best for cannel coal.

EFFECTS OF TEMPERATURE ON QUALITY OF TAR.

Dr. Letheby dwelt prominently on this subject, which has lately attracted so much attention in the valuable patents of Mr. Young for distilling paraffin oils, and the tedious lawsuits which have arisen out of them. The tar produced at a high temperature is always heavier than water, its specific gravity varying from 1.12 to 1.15, yet dries freely in the air by oxydation. It contains hydrocarbons, with such an excess of carbon, that they cannot be burnt in a common lamp. The hydrocarbons are almost wholly destroyed (absorbed?) by strong sulphuric acid. They contain about 86 per cent. of carbon, 7 hydrogen, 7 oxygen, and about ½ per cent. of sulphur. On the other hand, the tar produced at a low temperature is lighter than water, having a specific gravity of .9; it will not oxydate or dry in the air. It contains hydrocarbons of the paraffin series, which are comparatively poor in carbon, and can be burnt in a lamp. They are not much acted on by sulphuric acid, they contain little or no sulphur, and their somposition is about eighty-four carbon, twelve hydrogen, and four oxygen.

The very opposite conditions prevail with regard to the gases, for at a low temperature, in fact, up to 1,800°, they are rich in the hydrocarbons which are not then formed in the tar, and at a higher temperature they are poor in the hydrocarbons which then constitute so great a proportion of the tar as to make its hydrocarbons too rich in carbon for purposes of ordinary combustion. Dr. Letheby sums up these results by stating that although much variation is due to the nature of the coal, the general rule is that high temperatures make a large quantity of gas with low illuminating power, and with a large proportion of sulphur compounds.

Dr. Letheby's observations are valuable as to the impurities of gas at different stages of the manufacture, and as to the mode of removing. He attributes to Mr. Hawkesley the first suggestion of the process of washing the gas in the ammoniacal liquor, in order to remove the ammonia. We have always considered Mr. Leigh, the consulting chemist to the Manchester Gasworks, as the author of this system, but are not prepared to adduce any positive proof on the subject. We believe the process to be extremely valuable, but do not quite see the grounds on which Dr. Letheby pronounces the use of ammoniacal liquor for working the gas to be a "natural inference." He says the proportion of ammonia contained in ammoniacal liquor varies from 1,000 grains in the gallon up to 4,000, and that 1,000 grains per gallon will require for saturation about six ounces of the strongest sulphuric acid, while 4,000 grains will require nearly twenty-six ounces. Then he says:—"It is manifest that the best and proper washing liquid is ammoniacal liquor." We do not perceive this inference so immediately as the learned lecturer puts it, but we do understand that if the ammoniacal liquor from the condensers is so slightly charged with ammonia as still to have a large capacity for absorbing more, and if, at the same time, it is so saturated with hydrocarbon vapors as to be incapable of taking in more of these, and thus injuring the quality of the gas, *then* it seems to be a natural inference that the ammoniacal liquor is a good washer and purifier, but we do not understand the lecturer to state this, although the inference may be obscurely gathered from his reported lecture.

At the great chemical works of Messrs. Kurtz and Co., of Liverpool, where many hundred tons of ammoniacal salts are annually manufactured, the gas liquor operated on yields from three-quarters of a pound to a pound and a quarter of sulphate of ammonia per gallon. As the ammonia in this salt exists in the proportion of seventeen to sixty-six, it follows that the gallon of liquor usually contains from 1,352 to 2,250 grains of ammonia per gallon. If, according to Dr. Letheby, water is capable of absorbing 4,000 grains of ammonia per gallon, it is evident that a large absorbing power is wasted in the ammoniacal liquor of gasworks, as usually sent to be manufuetured into salts of ammonia.

According to Dr. Letheby, gas, on leaving the condensers, should not contain more than 1 volume in 1,000 of ammonia, 8 of sulphuretted hydrogen, and 20 of carbonic acid. These proportions amount, by weight, to 315 grains of ammonia, 5,048 grains of sulphuretted hydrogen, and 16,336 grains of carbonic acid in 1,000 feet of gas.

Since 1,000 cubic feet of gas having a specific gravity of .42 weigh about 32 lbs., it follows that more than 2 lbs, of this, or one-sixteenth part by weight of unpurified gas consists or carbonic acid.

Dr. Letheby proceeds to consider the best mode of removing these impurities. He says the ammonia should be first removed, because its presence checks the withdrawal of the other impurities. That dilute sulphuric acid is the best material for removing ammonia, and as it has been found that 49 parts by weight of the strongest sulphuric acid will remove 17 parts of ammonia, it follows that 908 grains or rather more than 2 ounces of acid, will be required to remove the 315 grains of ammonia from 1,000 feet of gas. "The acid," continues Dr. Letheby, "is best used when diluted with about three times its bulk of water and sprinkled upon sawdust, which should be placed first upon the trays of the purifiers, and the sawdust thus saturated with the ammonia is a valuable material, as it should contain fully half its weight of sulphate of ammonia." The doctor then alludes to other agents for absorbing ammonia, such as the spirit acids from various manufacturing processes, the acid salt of alumina obtained by boiling shale with sulphuric acid (Croll), and the residual chloride of manganese from bleach works, as used by Mr. Croll in the form of a nearly dry mixture with sawdust, and which yields a salt of ammonia remarkably free from impurities.

The proposal to use sulphuric or other acids for absorbing ammonia is strongly objected to by many gas engineers, on the ground that the acids absorb the hydrocarbons as well as the ammonia, and thus injure the illuminating power of the gas. In using acids, therefore, to separate ammonia, it is necessary to make the gas in the first instance of somewhat higher illuminating power, in order that it may withstand this process of purifying, without undue deterioration of its quality.

Dr. Letheby considers, like Mr. Lewis Thompson, that wet lime is the best agent for removing sulphuretted hydrogen, and also for absorbing the carbonic acid. He considers wet lime preferable to dry lime, because the properties of the lime are more efficiently exercised in the wet than in the dry state, which contains little lumps of lime which are never reached or acted on by the gas. The use of lime, however, either in the dry or wet state, is almost impracticable in London and other very large towns, where it accumulates in such quantities when used as a purifier, as to be a source of great annoyence to the public and expense to the companies. Dr. Letheby observes that, theoretically, twenty-eight parts, by weight, of lime will absorb seventeen of sulphuretted hydrogen, and another twenty-eight parts will take up twenty-two of carbonic acid. Hence about 1¼ lbs. of lime will be required to combine with 5,048 grains of sulphuretted hydrogen, and about 3 lbs. to combine with the 16,336 grains of carbonic acid present in 1,000 feet of gas. This will make 42½ lbs. of lime necessary to purify 10,000 feet of gas. But this is on the supposition that the lime is thoroughly wet, and that every particle is effective; as this is not so in practice; it is found that in reality about 50 lbs. of lime are required to purify 10,000 cubic feet of gas. But if the lime be used in the dry state, a much larger portion of the lime is ineffective owing to numerous small lumps and nodules, the interior of which is not exposed to or acted on by the gas at all. Besides this, the lime is constantly getting drier in the purifiers, owing to the heat produced by the combination of the gas with the various impurities. The combined consequence of these is such that at least double the quantity, or 100 lbs. of lime, is required in the dry lime purifiers to purify 10,000 feet of gas. Lime varies in weight from forty-four to fifty-three pounds per cubic foot, say, on an average, fifty pounds per foot. Then, according to Dr. Letheby, two cubic feet, or 100 lbs., or rather more than a bushel and a half of lime, are required to purify 10,000 cubic feet of gas. This is rather an extreme quantity of lime, although we are aware of gasworks in which a poor description of lime is used, and where the proportion is quite as great as that given by Dr. Letheby. Where good chalk lime, however, is used, the quantity need not exceed a bushel for 10,000 feet when used in the dry state, and it is not unusual to calculate that a bushel of good lime used in the wet state will purify 25,000 feet of gas.

Dr. Letheby then goes on to consider the oxide of iron as a purifier greatly to be preferred in towns to the use of lime, which yields the notoriously offensive "blue billy" of gasworks. The oxide of iron used is the sesquioxide, containing two equivalents of iron to three of oxygen. Thus eighty grains of oxide contain fifty-six grains of iron combined with twenty-four of oxygen. Sulphuretted hydrogen has an atomic weight of seventeen, and consists of sixteen grains of sulphur combined with one grain of hydrogen. In the decomposition which takes place, the iron combines with the sulphur to form sulphide of iron, while the liberated hydrogen combines with one equivalent of oxygen to form water. Hence, every seventeen grains of sulphuretted hydrogen requires twenty-eight grains of iron, and as this quantity cannot be obtained from less than forty grains of the oxide, it follows that forty grains of oxide must be used for every seventeen grains of sulphur present in the gas.

As we have seen that the quantity of sulphur present is 5,048 grains per 1,000 feet, the following will be the weight of oxide required to purify 10,000 feet of gas:

$$\frac{5048 + 40}{1.7 + 1000} = 17 \text{ lbs.}$$

Dr. Letheby says that only 33 lbs. of oxide are required for 17 lbs. of sulphuretted hydrogen, so that he makes only 14 lbs. for 10,000 feet of gas. There appears, however, to be some error in the calculation, and we believe the above to be the correct one.

These remarks apply to the anhydrous peroxide of iron, but if hydrated peroxide be used, more than 40 grains will be required for every 17 grains of sulphu-

retted hydrogen, and 10,000 feet of gas will require more than 17 lbs. for its purification.

But the power of the oxide is not exhausted even when charged with this large proportion of sulphuretted hydrogen. When exposed to the action of the air, the sulphide of iron becomes decomposed, so as to leave the sulphur free, while the hydrogen combines with oxygen to form water. Practically, the oxide may be thus vivified about four times in succession, so that when fully charged with sulphur it is found that a ton of oxide has purified about 5,000,000 cubic feet of gas, and has absorbed about 3,600 lbs. weight of sulphuretted hydrogen. In this state it is valuable for manufacturing oil of vitriol.

The peroxide of iron has no action on carbonic acid, and as this latter is very destructive to the illuminating power, Dr. Letheby observes that after purification by the oxide, lime must also be employed to remove the carbonic acid.

Dr. Letheby thus enumerates the constituents of the gas after it leaves the purifiers, and the extensive range within which these exist.

Hydrogen	25 to	30	per ct.
Light carburetted hydrogen $C_2 H_4$	35 to	52	"
Olefiant gas $C_4 H_4$, Probyline $C_6 H_6$, Butyline $C_8 H_8$, Other hydrocarbons Cu Hn, Benzole vapor $C_{12} H_6$, Acetyle $C_4 H_2$	3 to	20	"
Carbonic oxide CO	5 to	9	"
Carbonic acid CO_2	0 to	2	"
Cyanogen $C_2 N$	?	?	"
Ammonia NH_3	0.01 to	0.06	"
Bisulphide of carbon CS_2	?	?	
Sulpho-hydrocarbons	?	?	
Aqueous vapor	0 to	2	"
Oxygen	0 to	1	"
Nitrogen	0 to	8	"

A considerable part of the lecture was occupied by experiments showing the properties of these various constituents, showing also the production of acetylide of copper, acetylene, and nitro-benzole, formed by passing the gas through fuming nitric acid. Dr. Letheby took the opportunity of sneering at the method of determining the illuminating power of gas by means of bromine, and at the same time spoke highly of Eidmann's gas prover, which, although highly ingenious and meritorious for what it really does prove, namely, the proper proportions of atmospheric air necessary for the combustion, is utterly useless and unreliable as a means of testing illuminating power. The Doctor again claimed the authorship of a mode of determining the amount of sulphur in coal gas. As we understand it, however, there is no novelty whatever it is, and we question if the Doctor's ordinary process for collecting sulphur in the products of combustion is, in several respects, so guarded and so free from error as the excellent method described by Dr. Hoffman more than two years ago.

We must now take serious objection to a statement of Dr Letheby, in which he attempts to define, on very insufficient data, and after a very superficial examination, the kind of argand burner best adapted for various qualities of gas.

Thus, he says that for argand burners consuming five feet an hour, with seven inch chimneys, and without a gauze diaphragm inside the gallery, a central opening of .42 inches is well suited for eleven-candle gas, one of .44 inches is for thirteen-candle gas, and one of .5, or half an inch, for fifteen-candle gas. Dr. Letheby, however, does not tell his hearers that what he calls fifteen-candle gas will turn out probably to be only ten or eleven candles, when tried by an ordinary commercial argand. What he should really have said is this, that a burner with half an inch internal bore will bring up the quality of poor ten or eleven-candle gas so as to make it appear equal to fifteen candles, just in the same way as any other interference with the burner which cuts off the current of atmospheric air, and spoils the intensity of the flame, will produce a rough, course, smoky *greantil* flame, which will throw more light on the disc of the photometer. He might also have told his hearers that real fifteen-candle gas cannot be burnt through such an argand as he describes without giving a wretched smoky flame far above the top of the chimney, and such as no consumer would think of using. To call gas fifteen-candle gas which can only be made to appear so by the use of a *fancy* and an impracticable burner, is a delusion and a snare.

Dr. Letheby's lecture concludes with a

TABLE SHOWING THE RELATIVE VALUES OF ILLUMINATING AGENTS IN RESPECT OF THEIR HEATING AND VITIATING EFFECTS ON THE ATMOSPHERE WHEN BURNING, SO AS TO GIVE THE LIGHT OF TWELVE STANDARD SPERM CANDLES.

	Pounds of water heated to 1° Fah.	Cubic feet of Oxygen consumed.	Carbonic ac... produced.	air vitiated.
Cannel gas	1950	3.30	2.01	50.2
Common ditto	2786	5.45	3.21	80.2
Sperm oil	2335	4.75	3.33	83.3
Benzoli	2326	4.46	3 54	88.5
Paraffin	3619	6 81	4.50	112.5
Camphine	3251	6.65	4.77	119.2
Wax candles	3331	8.41	5.90	149.5
Sperm ditto	3517	7.37	5.27	131.7
Stearine ditto	3747	8.82	6.25	156.2
Tallow ditto	5054	12.06	8.73	218.3

The above table is very unsatisfactory, because it gives neither the quantity nor weight of gas consumed in order to produce the heating effects described in the second column, nor does it give the weight or other quantity of the oils and candles which are afterwards enumerated.

From some parts of the table we should infer that the unit contemplated in each case is the quantity of each material required to give a light of twelve sperm candles for one hour.

The quantity of carbonic acid produced corresponds more nearly with this unit than with any other, but even on this supposition the results are very different from those arrived at by Dr. Frankland, and published by Dr. Letheby himself at p. 124 of his little book on "Artificial Light," in "Orr's Circle of the Sciences." Dr. Frankland clearly states the amount of carbonic acid produced per hour by tallow candles giving a light equal to twenty sperm candles, is 10.1 cubic feet. Hence, if a light of twenty sperm candles give 10.1 feet of CO_2, a light of twelve should give, by proportion, six cubic feet of CO_2, but Dr. Letheby's table gives 8.73 cubic feet of CO_2, produced by the tallow, and there is the same discrepancy in most of the other results.

Whatever standard has been adopted by Dr. Letheby, however, the column containing the pounds of water heated to one degree Fahr. by each report seems to be much at variance with experiments quoted by Dr Lewis Thompson and others. Again, what means the column showing the volume of air vitiated by each of the agents? In this column the air vitiated by cannel gas (what kind of cannel gas? twenty-candles, as in London and Lancashire, or thirty-two-candles, as supplied in Scotland?) and 218 feet by tallow candles giving the same light. Is it possible that four times as much air is vitiated by cannel gas as by tallow giving the same light? We fear there are some serious errors in this table, and that much more reliable experiments are required to determine the results which Dr. Letheby seems to have relied on. Besides, what is the meaning of vitiated air? We presume Dr. Letheby attaches some definite meaning to it, and contemplates some precise amount of deterioration. A single light of any kind burning in any chamber, however large, will of course, vitiate the air in some degree: but the question is to what extent does the vitiation take place, and this Dr. Letheby's table in no way explains.

IMPROVEMENTS IN THE MANUFACTURE OF GAS AND OTHER SUBSTANCES FROM TAN AND SIMILAR MATERIALS.

We extract the following from "*Newton's London Journal of Arts and Sciences:*

This invention relates to the mode of carbonizing tan, spent dyewoods, spent hops, sawdust, and similar materials, so as to improve the quality of the gas obtained therefrom.

The process is as follows:—The patentee employs the usual D-shaped retort, about sixteen feet long, and open at both ends, which openings, for the sake of clearness, may be called A, and B,—the exit pipe being at the opening B. At A, a charge of raw material is introduced, either alone or mixed with tar. When this charge is about half carbonized, the lid is opened at A, and by means of a kind of partition or slide, loosely fitting into the interior of the retort, the mass of charcoal and undecomposed matter is pushed forward towards B, so as to leave empty about two-thirds of the length of the retort from A; and a fresh charge of raw material is then introduced. By the time that this charge is half done, and ready to be moved forward, the former charge will be completely carbonized, and the charcoal is withdrawn at B, while another charge of raw material is introduced at A, and so on continuously,—the object being always to have two charges in the retort in different stages of carbonization. When the tan or similar material is introduced into the retort, it rapidly carbonizes externally where it is in contact with the retort, but resists for a considerable time in the interior of the mass. Moreover, the gas so produced is little illuminative, unless the heat be raised very high, or the tan have been previously dried. Now, by the present process, two principal advantages are obtained, viz., first,—by pushing forward the externally carbonized charge, the mass is partially stirred up, and thus presenting fresh surfaces to the action of the heat, its further decomposition is much accelerated; second,—the gas and vapors arising from the raw charge at A, being obliged to pass over and through the mass at B, consisting, to a great extent, of incandescent charcoal, and mingling with the vapors evolved therefrom, become partially decomposed, and enter into new combinations or are carburetted. The result is a highly illuminative gas.

When the gas is to be used for illumination, it should be passed through lime or caustic alkali, in order to free it from admixture of carbonic acid. The other products of the process, as charcoal, tar, acetic acid, ammonia, and naphtha, are treated and utilised in the usual manner.

The patentee claims, "the mode of carbonization as above described."

NEW YORK MINING EXCHANGE.

New York *July* 14, 1864.

	Bid.	Asked		Bid.	Asked
Copper Stocks.			***Gold Stocks.***		
Aztec	—	—	Benton	1¼	3
Bedford	—	—	Connecticut M'g Co	—	1⅛
Boston	—	—	Consol'd Gregory	—	—
Caledonia, A. P.	—	14	Corrisanie	—	—
Canada	3	3½	Corydon	—	—
Carp Lake	—	—	Gunnel	3	3⅞
Central	—	—	Isaac's Harbor	⅛	1⅛
Columbian	—	—	Kipp & Buell	—	3
Copper Falls	—	—	Mammoth Gold	—	—
Clifton	—	—	Mariposa	—	—
Dacotah	—	—	New York	—	—
Derby	—	—	N. Y. & Nova Scotia	⅛	2
Douglass	—	—	Quartz Hill	—	13
Evergreen	20	20¼	Quicksilver M'g Co	—	—
Flint Steel River	—	—	Rocky Mountain	—	9⅛
Frue	—	—	Smith & Parmlee	6	—
Grand Portage	—	—			
Hancock	—	—	***Coal Stocks.***		
Hamilton	—	—	American	—	—
Hilton	5	6¼	Ashburton	—	—
Hudson	—	—	Central	—	—
Huron	—	—	Cumberland	—	—
Indiana	—	—	Del. & Hud. Canal	—	—
Isle Royale	20¼	23	Hampshire & Balt.	—	—
Keweenaw	—	6	Pennsylvania	—	—
Knowlton	—	—			
Lafayette	—	2¼	***Lead Stocks.***		
Manhattan	—	8	Bucks County	—	⅜
Mendota	—	5	Clute	—	1⅞
Merrimac	—	5	Erie	—	—
Minnesota	—	37	Macomb	—	—
New York, A. P.	—	—	Plancentia Bay	—	—
N. J. Consolidated	—	4	Sussex	—	80c.
Norwich	—	—	Wallkill	—	—
Ogima	—	—			
Ontonagon	—	4¾	***Iron Stocks.***		
Pena	—	—	Copake	—	—
Providence	—	—	French Creek	—	—
Quincy	100	104	Teal Lake	—	—
Reliance	—	2¼			
Rockland	—	—	***Miscellaneous.***		
Superior	—	—	Rutland Marble	—	—
Sharon Consolidated	—	—			

The following manufacturing concerns in South Boston paid Government taxes during the year ending May 1: Bay State Iron Company, $24,076 50; Downer Kerosene Oil Company, $52,121 32; Felton & Waters, Distillers, $29,669 18; Harvey & Morris, Brush Manufactory, $1,481 13; R. Hoe & Co., Printing Press, $1,555 32; James P. Ingols & Co., Brass Foundry, $1,041 09; Francis H. Jenney, Oil, $7,092 55; Naylor & Co., Wire Works, $13,810 94; New England Roofing and Manufacturing Company, $1,755 43; Libbey & Howe, Glass, $2,299 05; South Boston Iron Company, $14,350 33; Suffolk Glass Works, $2,466 05.—*Scientific American.*

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JAMES W. BRYANT, ... EDITOR.

FRIDAY, JULY 16, 1864.

THE LIST OF GAS COMPANIES.—It will be noticed by our readers, that we have omitted the publication of the list of Gas Companies in the United States. Our reasons for doing so, is because they occupied much space which could be filled with matter of greater interest. Those requiring them or reference, can easily refer back to the files of the JOURNAL, and a faithful record of all new companies will be furnished by our paper whenever they may be organized.

TO ADVERTISERS.—Our paper offers a superior medium as an advertising agent, to all those who manufacture or sell machinery or appliances of any kind for Gas, Mining, Water, Sewerage, the production or purification of Oils, &c. &c., not so much on account of a wide-spread circulation, as from the fact that it goes directly to the hands of those who are constantly using and requiring machines and improvements for these branches, and who look through our columns for information where to procure them. The class of people who read our paper, not only peruse our pages of reading matter, but read the advertisements as well, for the reason that they are directly interested in all things pertaining to their business. We therefore ask, with confidence that we can do them justice, all parties having machinery or improvements of any kind for either of the objects to which our paper is devoted, to send in their advertisements and avail themselves of these advantages. It will be observed that our terms for advertisers are very reasonable.

GAS FITTING.—The importance of employing the best mechanics for gas fitting, is not sufficiently appreciated by the public. The pipes are often inadequate to supply the requisitions of gas, and the joints and connections are put together so inefficiently, that much gas escapes, whereby the atmosphere is affected, besides the increase of expense. In one establishment, where fifty brilliant five-feet burners were wanted, the party was continually changing burners; by accident we learned the fact, and upon examination discovered the pipe from the main was only capable of supplying about one hundred cubic feet per hour, when two hundred and fifty cubic feet was required! There are gas fitters in abundance in every part of the city, but we would advise parties employing them to be certain that they understand their business well.

The Albany Gas Co., has raised its rates to four dollars per thousand feet.

MINING ENTERPRISE.

That mining enterprises are henceforth destined to be an important element in our industrial polity there can be little doubt. The hold which they have already taken upon commercial ambition is so deep and tenacious that it will not be relinquished but with a violent rending of the purse-strings. And this there is no reason to apprehend.

The men that have flourished as merchants in our country heretofore were not educated to the science or the art of mining. They were buyers and sellers. And these are the classes that first establish trade in all communities. Following next upon them are the artizans and makers of the smaller and coarser articles of personal use, which convenience indicates can best be fabricated amongst neighborhood consumers. With the increase of wealth and skill factories are established; the economic science of combination and co-operation begins to be developed by force of circumstances, and is studied and appreciated in its results by practical men, whilst the thinkers are at work elucidating and establishing its laws for its wider application.

It is only when the arts of civilization begin, by their development, to demand new materials for their perfection that the rocks are made to yield up their hidden treasures. It is, indeed, true that as society begins to emerge from the crysalis state, man immediately begins to feel the want of something more substantial than the stone utensils and tools of the savage; and one of the surest signs of progress is the substitution of iron in the place of his rude and fragile implements. Fortunately—we may rather say providentially—this most needed of all the metals is the most abundant, and the most easily obtained. With the discovery of its adaptation to human wants a new era was opened for the progress of the race. But the business of procuring the ore, extracting, working, and shaping the metal, is one requiring capital, skill, and labor. Perhaps, in a more marked manner, this is true with regard to the other metals. Hence the opening of mines and the working of their products is naturally a branch of industry restricted to the older communities of the world.

In all the stages of the progress of society in its industrial developments, individuals have appeared who, by their contemporaries, were set down as enthusiasts, visionaries, and speculators, but to whose memory the posterity of those same harsh judges erect monuments. Their fault has simply been that the exigencies of the day did not demand such services as they proposed to render. Their prescience came like a consignment of strange wares to a market where they were not in demand. And so they passed away in poverty and neglect, leaving the truths they had discovered to work out their legitimate results under the alchemy of time. Nevertheless, whilst these pioneers have suffered in their present personal comfort and interests, they have opened the way for the less adventurous, the comparatively ignorant, the mere plodder, to step in and eat the fruits of their foresight and enterprize.

It has been so in a marked degree in relation to the business of mining in our own land. Labor has, down to a very recent period, been abundantly rewarded in other pursuits, and so, the few who have attempted to enlist capital in the exploration of the mineral wealth under our feet, have been neglected or pushed aside as schemers with little of that kind of sense which commends itself to those who pride themselves on being "practical men."

But the hour for the vindication of the schemer always comes round on the chronometer of trade. Capital has been increasing until the ordinary channels for its use have overflowed; science has caught up the discoveries of the pioneer, and reduced his facts and truths into system; the labors of the more venturesome have exhibited golden results; and now the multitude, who are ever ready to worship success, are pressing into the field. Too many, from all classes of traders, have at length interested themselves in mining schemes for the business to be frowned down as unworthy to be enrolled in the category of legitimate trade. Mining, as a pursuit, has gotten to be respectable.

And well it may be. For its elements are as sure and fixed as those of any other branch of industrial employment.

In the first place, the metallic productions of the earth are needed. They enter into all the arts by which the convenience, the comfort, or the luxury of civilized communities are sustained.

Again, their values, as compared with agricultural products, manufactured goods, and wages of labor, are settled. They occupy a fixed place in the scale. Doubtless they are subject to the general laws of supply and demand, by which all articles of man's consumption are effected. But their liability to fluctuation in price is not so great as that of most other articles of trade, for the evident reason that their production is generally so slow and laborious that it seldom goes beyond the regular demand. And as to the precious metals, the demand for them, outside the circle of the arts, will continue unabated until some other medium of exchange is introduced among the nations.

Once more, the metals seem to exist in their beds, and to be discovered in the order of time, to an extent as nearly equal as may be to the necessities of man for their use. Of the accuracy of this statement, no more striking evidence need be offered than the presence of iron in almost all countries, in different forms in the various geological measures, and in combination with the materials essential for the extraction of the metal from its ore.

The metals, then, must be had. In our next issue we propose to inquire, briefly, whether the procurement of them will pay, as compared with the employment of capital on other industrial pursuits.

ANSWERS TO CORRESPONDENTS.

J. W. G., *Providence, R. I.*—In reference to injunction as to the Patent Laws, as well as any business connected therewith, we would refer you to the *Scientific American*, which is published at No. 37 Park Row, in this city, where you can learn everything you may require with more accuracy, than by any other means. The *Scientific American* is an old established paper, conducted with great tact and talent, and has, most justly and deservedly, the confidence of all interested either in Mechanics, Science, Art, and Agriculture. We do not propose to do anything in the patent business, and therefore would recommend you to Messrs. Munn & Co., with the fullest assurance that you will be dealt with most honestly.

FROM CALIFORNIA.

The following telegraphic report from San Francisco, July 11th, says:

"The depression in mining stocks continues, and bids fair to last a considerable time. The paying mines of Washoe are retrenching. The feeling in favor of more economy gains ground.

"The steamer *Pacific*, from Oregon, and British Columbia, with twenty-five hundred thousand dollars in gold, have arrived. Mining speculations reported favorably."

RICE.—Rice was introduced into South Carolina by mere accident. In 1696 the master of a vessel from Madagascar landed about half a bushel of an excellent kind, from which small beginning sprung up an immense source of wealth, both to the agriculturists and merchants of the Southern states. Within little more than half a century from that time, 120,000 barrels of rice were exported in one year from South Carolina and 18,000 from Georgia, all from the remnant of a sea store left in the bottom of a sack.

SCIENTIFIC INTELLIGENCE,

Translated for the Mining Reporter from foreign journals, by Professor HENRY WURTZ.

PRECIPITATION OF COPPER AND SILVER FROM SOLUTIONS BY MEANS OF SPONGY IRON.

G. Bischof grinds fine the roasted iron pyrites produced as a waste product of the manufacture of sulphuric acid from pyrites, mixes it with 25 per cent. of carbon, and heats it to a strong red heat in retorts for from eight to twelve hours, cooling carefully, without contact of the air. The finely divided iron thus produced precipitates the other metals from solutions with great rapidity, and very pure.—*Polyt. Centralblatt*, 1863, *p.* 1173.

EXTRACTION OF AURIFEROUS SILVER OUT OF ORES IN THE LIQUID WAY.

When ores contain alloys of gold and silver, the ordinary modes of extraction in the liquid way give very unsatisfactory results, the yield being always too low. Even when the hyposulphites, of which such excellent use is made in extracting silver, leave a considerable portion of the gold undissolved. It is found necessary to apply first Augustin's or Zieruogel's method to extract the silver, and then Plattner's method to obtain the gold, or the converse; but in every case both gold and silver remain in the residue, and it is necessary to repeat the operation, or to concentrate the residue by smelting. The explanation of this is, that none of the solvents used hitherto are capable of dissolving simultaneously the gold and the silver, and there is always formed on the surface of the alloy a film insoluble in the agent employed. For instance, if chlorine water be used, part of the gold is dissolved, but by the formation of insoluble choride of silver, a limit to the action is soon reached, and if then the chloride of silver is dissolved in ammonia, common salt, or a hyposulphite, there is soon formed a coating of metallic gold, which protects from action the interior parts of the alloy. The agent proposed for overcoming these difficulties is simply a concentrated solution of common salt saturated with chlorine. The ore is simply roasted and lixiviated with this solvent, which takes out all the gold and sliver.—*Chem. Centralblatt, Jan.*, 1864, *p.* 31.

TUNGSTENIFEROUS IRON.

Le Guen has made experiments in the Arsenal at Brest, and found that 2 per cent. of wolfram added to a mixture of old and new cast-iron, gave it a greater hardness and elasticity. This held with several mixtures with different kinds of iron. When French wolfram was used, a second melting was observed to lessen the hardness somewhat. It is only necessary to throw the pulverized wolfram into the fluid metal, the tungstic acid being reduced by the carbon of the iron. As the French wolfram, however, contains sulphur and arsenic, it must previously be roasted.—*Comptes Rendus, tome* 56, *p.* 593.)

METHOD OF WORKING POOR ORES OF LEAD.

For operating on lead ores, which contain too little lead and too much quartz to be smelted profitably, Lampadius treats with muriatic acid, with heat, upon plates on stone or lead, by which the galena is completely converted, if the ore has been properly prepared, into chloride of lead. The mass is then lixiviated in tubs with double bottoms, holding each 15 or 20 cwt., with boiling water, to extract the chloride of lead, which crystallizes out in great part on cooling, the mother liquor being again heated to boiling, and used over again continually. The deposited chloride of lead is reduced to the metallic state by zinc (why not iron? H. W.,) forming a spongy lead, which may be either melted down (probably after pressure. H. W.), or used for making white lead, &c. Some iron having been thrown down from the chloride of zinc solution by chloride of lime, the zinc may be precipitated by lime as pure white oxyd of zinc, suitable for pigmentary purposes.—*Chem. Centralblatt, Jan* 1864, *p.* 80.

[NOTE.—In cases in which the use of muriatic acid in this way would be economical, it seems to me that the above method is much more complicated and roundabout than necessary. Why cannot the chloride of lead, after it is obtained in this way, be immediately reduced to metal by melting with suitable fluxes, or by the action of reducing gases? The old observation of Goebel is well known, that carbonic oxyd, at a red heat, completely reduces chloride of lead, with formation of phosgene gas. H. W.]

RAMMELSBERG ON THE NATURE OF ALLOYS.

In examining the furnace products of the Bohemian tin works, he found an alloy of copper and tin, containing 18.91 of copper to 80.82 of tin in long thin six-sided prisms, taking a gold-yellow tarnish; also a another alloy of 8.05 per cent. of iron, and 92.01 of tin, forming bright gray, exceedingly soft needles. Rammelsberg adopts the theory now gaining ground among chemists, that crystallized alloys are merely isomorphous mixtures of the constituent metals, believing their existence to show that dimorphism is a general property of metals. Thus *brass* has been observed in forms of the regular system, isomorphous with copper, while zinc is hexagonal, from which H. Rose inferred the dimorphism of zinc. Rammelsberg, however, goes further, and believes that many minerals are merely crystallized mixtures of their metallic constituents. Thus, monometric crystals of *smaltine*, of the the cobaltiferous and nickeliferous varieties, and of *skutterudite*, the arsemites of cobalt, nickel and iron, he thinks are merely alloys, or mixtures in variable proportions of the hexagonal arsenic with the other metals, and states that recent analyses prove this. The hexagonal metals, arsenic and antimony, also form hexagonal alloys with the monometric nickel. Monometric iron and gold, each form with dimetric tin dimetric alloys. Woehler has also found a dimetric *smaltine*, consisting, therefore, in part, of the monotric cobalt and nickel, and the hexagonal arsenic. Zinc, also, forms trimetric alloys with antimony, showing it to be trimorphous (monometric, hexagonal, and trimetric.) Silver may also be trimetric in *diserasite*, &c. This view, if found in every respect satisfactory, would no doubt simplify to a very great degree our ideas of the constitution of the great multitudes of ores and varieties of ores composed of combinations of various metals without metalloids.—*Pogg. Annalen, Vol.* 120, *p.* 54.

A NEW LIGHT.

The magnesium light is richer in iactinic power than any artificial light known—is so rich, indeed, in chemical rays, that the sun itself, when unobscured by fog or cloud, exceeds only by 34 times the chemical power of a magnesium flame having the same apparent diameter as that which the sun presents. The result is that by the light produced by the combustion of magnesium wire, such as is now being sold at 3d. a foot we are able to obtain, in any weather, and at any hour of the day or night, much better photographs than can ever be obtained in this country by sunlight, except on such clear and sunny days as occur in this climate but very rarely indeed. Magnesium will thus render us henceforth independent of the sun for photographic purposes, and will, moreover, enable us to obtain photographic pictures of places—such as the interiors of caves and mines, the passages in the interior of the Egyptian pyramids, and the like—into which the sunlight never enters nor can enter. But it is not in actinic power alone that the magnesium light exceeds all other artificial lights yet produced. For the purpose of artificial illuminations generally it is without a rival. A very thin magnesium wire will give off, in burning, as much light as a very powerful electric light, is soft and diffusive, and does not in the least dazzle or pain the eyes. It is, moreover, of the purest white, so that all colors, even to the most delicate tints, are seen in it as perfectly as in sunlight, while a magnisum lamp has over both the electric lamp and the ordinary gaslight the advantage that it can be carried about as readily as a candle. A still greater advantage—one, indeed, of immense importance—which the magnesium light has alike over gas, and over any kind either of oil-lamps or of candles, consists in the circumstance that magnesium, in undergoing combustion, gives off no deleterious vapors, nor, indeed, any vapors of any kind. Instead of its burning, as gas, candles, and oil do, into aqueous vapor and carbonic acid, with a greater or less admixture of sulphuretted hydrogen, and other furniture-destroying, plate-tarnishing, and health-injuring compounds, the only product of the combustion of magnesium is a harmless solid, the oxide of magnesium, or magnesia. All this points to the magnesium light being likely to come extensively into domestic use, while its great brilliancy would seem to render it eminently adapted for use in light-houses. In all probability its price will not long be an obstacle to either of these two applications of it; for even now, while the manufacture of magnesium is not yet three months old, the light from magnesium is but little more costly, quantity for quantity, than from "composite" candles, seeing that two and a half ounces of magnesium will give forth, during combustion as much light as 20 pounds of the best stearine.—*London Ironmonger.*

THE BOWIE KNIFE.—It is said that one Black, the first manufacturer of the Bowie knife, is the only man who possesses the secret of making and hardening these knives so as to render them equal to the original. His mode of testing them was to lay a half-dollar upon a block, and with one stroke of the knife cut it in two. If it performed the work the knife was all right; if it turned or hacked the edge, he would condemn it. According to the Nevada *Gazette*, which paper derives its information from parties well acquainted with both Black and Bowie, the first Bowie knife was made out of a common blacksmith's rasp, by Black, from a pattern whittled out of a shingle by Bowie, with his jackknife. The manufacture of that pattern was the only connection which Bowie ever had with the knife, except to give his name to it and slaughter several people with the first knife made as above.

THE NEW TAX BILL AND ITS PROVISIONS.

Our readers are doubtless aware that the taxation on manufactured articles and materials has been increased, but has not yet become a law. We subjoin that portion which relates to metals, etc.

"The bill increases all the rates on iron equal, as iron not otherwise provided for, and on imitations of said iron, $1; and potter's iron, stoves, and stove plates of cast-iron, 11½ cents per pound; on cast-iron steam, gas, and water pipes, 11½ cents per pound; on cast-iron butts and hinges, 2½ cents per pound; on all castings of iron not otherwise provided for, 35 per cent. ad valorem; on old scrap iron $9 per ton.

"On steele in any form, not otherwise provided for, 30 per cent. ad valorem; on cross-cut saws, 10 cents per lineal foot; on mill, pit, and drag saws, not over nine inches, 15½ cents per lineal foot; on all manufactures of steel, or of which steel shall be a component part, not otherwise provided for, 35 per cent. ad valorem—provided that all articles partially manufactured of steel, or of which steel shall be a component part, not otherwise provided for, shall pay the same rate of duty as if wholly manufactured.

"On lead in pigs and bars, 2 cents per pound; on old scrap lead, fit only to be re-manufactured, 2 cents per pound; lead in sheets, pipe or shot, 2½ cents per pound; pewter, when old, and fit only to be re-manufactured, 2 cents per pound; lead ore, 1½ cents per pound.

"Copper in pigs, bars, or ingots, 2½ cents per pound; copper, old, and fit only to be re-manufactured, 2 cents per pound; sheating copper in sheets, 48 inches long, and 14 inches wide, weighing from 14 to 15 ounces per square foot, 3½ cents per pound; copper rods, bolts, nails, spikes, copper blocks, copper in sheet or plate called brazer copper, and other sheets of copper not otherwise provided for, 25 per cent. ad valorem.

"On zinc, spelter, or tin, manufactured in blocks or pigs, 1½ cent per pound; zinc, spelter, or tin, sheets, 2½ cents per pound."—*Scientific American.*

THE MACHINERY OF THE HUMAN BODY.—Very few mechanics are aware how much machinery there is, in constant action, in their own bodies. Not only are there hinges and joints in bones, but there are valves in the veins, a force pump in the heart, and curiosities in other parts of the body equally striking. One of the muscles forms an actual pulley. The bones which support the body are made precisely in that form which has been ascertained, by calculations and experiments, to be the strongest of pillars and supporting columns—that of hollow cylinders.

PETROLEUM AS A FUEL.—An English architect, by the name of C. F. Richardson, now residing in London, has discovered and registered under the English Government, a very simple process, by means of which Petroleum,—American coal oil,—can be used as fuel for steam engines, or any kind of furnace, in lieu of coal, with safety and economy.

Upon this subject, the London Sanitary Reporter, also says:

"It is erroneous to imagine that experimental inquiry in this path of science is confined to America. Very recently a locomotive was being fitted, on the St. Helen's Railway, to burn coal oil, on a system proposed by Mr. W. B Adams; the results have not yet transpired. Our neighbors in France, too, belong in the same field. A Letter from Paris says —'We have heard much lately of a plan for substituting petroleum oil for coal on board steamers. By experiments made here, it has been proved that the oil will generate as much steam power in twenty-eight minutes as coal in an hour. Then there is the great saving of stowage, and an economy of expense by which it is asserted that 77,000 frs. would be saved in one voyage across the Atlantic.' All this promises well, and, if the supply hold out, great things may yet be accomplished by the new fuel."

COMBUSTION OF GUNPOWDER IN A VACUUM.—The eminent French chemist, M. Bianchi, is the author of some curious experiments of the combustion in a vacuum. He found that this substance, and also the fulminates, burned quickly if loose in an exhausted vessel, and suddenly brought to a temperature exceeding two thousand degrees. If, however, the powder was placed, under similar circumstances, in a pistol, it inflamed with the suddenness exhibited in the air. Gun-cotton slowly disappeared; the layer nearest the source of heat going first, but without the production of any light. In all these cases the products of combustion were the same as in air. Combustion also took place in nitrogen, carbonic acid, and other gases which do not support it, with little diminution of the ordinary rapidity of the process.

A BALLOON rises in the air because the gas in the balloon is lighter than the air around it; the attraction of the earth draws the heavier air down under the balloon and thus pushes it up. The buoyancy of a balloon consequently depends upon the specific gravity of the gas with which it is filled. The lightest gas is hydrogen; it is 14½ times lighter than air. About 13 cubic feet of air weigh one pound and about 188 feet of hydrogen. In round numbers, 14 cubic feet of hydrogen will raise one pound in the air, and it will take 7,000 cubic feet to raise 500 pounds. As the density of the air diminishes rapidly with the altitude, the size of the baloon must be increased for any considerable ascent. A horse-power is that which will raise 33,000 pounds one foot per minute; a half-horse power would therefore raise 82½ pounds 200 feet per minute. It is possible that a steam engine might be made weighing less than 200 pounds, which could be worked up to a half-horse power.—*Scientific American.*

The San Francisco *Mining Press* says that fourteen citizens of African descent, have organized themselves into a quartz mining company, in Mariposa county, and are taking hold of their work with considerable energy and enterprise.

JAPANESE ART.—In all the mechanical arts the Japanese have unquestionably achieved great excellence. In their porcelain, their bronzes, their silk fabrics, their lacquer, and their metallurgy generally, including works of exquisite art in design and execution, I have no hesitation in saying that they not only rival the best products of Europe, but can produce in each of these departments works we cannot imitate, or perhaps equal. It is quite true that Europe may also make a similar boast with justice. There is much especially in art, so called, to which the Japanese cannot make the slightest pretensions. They cannot produce, by any effort, works to be compared with the noble speciemens of Repousse carving, from the chisel of a Vechte, a Morel Ladeuil, or a Monti, which the great International Exhibition showed; yet the Japanese bronze castings are, some of them, scarcely inferior in skiled workmanship and mixture of metals to anything we can produce of the same kind. No Japanese can produce anything to be named in the same day with a work from the pencil of a Landseer, a Roberts, or a Stanfield, a Lewis, or Rosa Bonheur, whether in oil or water colors; indeed, they do not know the art of painting in oils at all, and are not great in landscape in any material. Their knowledge of perspective is too limiteted, and ærial effects have scarcely yet entered into conception. But in figures and animals, I have some studies in Indian ink, so graphic, so free in outline and true to nature, that our best artists might envy the unerring touch and pencil so plainly indicated. In the rendering of animals, whatever the material employed, they seem to have studied not only the mere forms, but the habits and character of each with such accuracy and closeness of operation, that they gain a perfect mastery over their subject, and by a few lines and dash of the brush produce a faultless imitation of nature. This is especially true of the stork, the emblem of longevity, and nearly as much admired by the Japanese as ever was its kindred ibis in Egypt. Hence, on gercelain, lacquer, in enamels, on ivory, in *basso relievos*, in steel and iron, in bronzes, it is everywhere to be met, and with a marvellous perfection of workmanship and artistic power.

The collecting of petroleum is generally regarded as a modern discovery made by Drake. But Herodotus, who lived 2,300 years ago—about the period of prophet Malchi—speaks of the collection of Petroleum in the island of Zante, on the western coast of Greece. Dr Chandler, in the early part of the present century, visited Zante and found an oil well in full operation, thus confirming the narrative of Herodotus. The patriarch Job had undoubtedly visited that well, or some other one, a flowing well at that—otherwise he would not have thought of the "rock pouring out rivers of oil."

IMPORTANT DISCOVERY, IF TRUE.—George Laid, of New Almaden, writes to the *Reese River Reveille*, stating that he has discovered a substitute for blasting powder, less dangerous and much cheaper, which can be made by any miner, at cost of but two dollars and a-half per keg. Mr. Laid says that it is a chemical compound mixed with sawdust; that a man can make twenty-five kegs per day in a common stove boiler, and adds that he is now using it with great success in the New Almsden mines.

OBTAINING IRON FROM ITS ORE.—In the ordinary method of obtaining iron from its ore, the stone or ore is calcined, then mixed with coke, coals, and limestone, and afterwards submitted to the action of a hot or cold blast-furnace. Mr. Silvester Ingledew, of Stockton-on-Tees, proposes to obtain the iron from the ore without the aid of a blast-furnace, and consists, first, in reducing the ore by grinding or pulverizing in an ordinary grinding apparatus, or one suitably arranged for the purpose; it is then to be placed in a perforated rotating chamber or receptacle, through which water passes, wherein the heavier particles of granulated metal are precipitated by gravity to the bottam, the lighter earthy and other matters being carried off by the water. This residuum of washed granulated iron ore (which still retains a small quantity of silicate and silicate of potassium) rs then conveyed to an open flat vessel or "drying-frame," where the moisture is evaporated therefrom, and it is afterwards passed into an ordinary air or reverberatory furnace, by which it is reduced to cast metal. In order to regulate the quality of the iron, he employs, in connection with the granulated iron from the drying frame, any necessary proportion of alkaline earth, alkaline bases, and carbonaceous matter, which will have the effect of chemically combining with any extraneous matter, so as to facilitate the separation of the iron, and so influence the quality of the same as to render it applicable to the production of bar-iron plates, or other descriptions of manufactured iron.—*London Mining Journal.*

LIGHTING GAS BY ELECTRICITY.—At the monthly stated meeting of the Franklin Institute, held February 18, 1854, Messrs. Cornelius & Baker exhibited a very beautiful method of lighting gas by means of frictional electricity, arranged for use with a bracket, two portable lightable lighters, and a table light, all being simple in arrangement and readily kept in order.

These instruments are constructed upon the principle of the electrophorus.

The electric bracket is arranged with a brass cup in the form of a vase, resting upon the bracket, with a connecting piece of hard rubber. This cup is lined with lamb-skin covered with silk, and contains the hard rubber electric piece which corresponds in form to the inside of the cup. A coiled covered wire connects the brass cup, with a wire attached to the burner, and terminating just above the burner.

In order to light the gas, the stop is turned, the hard rubber piece lifted partly from the cap, thus liberating the spark and lighting the gas.

The Portable Lighter consists of the same vase or cup, with the addition of a non-conducting handle.

When the brass cup is lifted from the electric piece and held to the conducting wire of the burner, the gas is immediately lighted.

Another portable instrument called Double Air-Tight Electrophorus, consists of two metallic tubes, each closed at one end, and connected together at the other, with a non-conducting ring of hard rubber, the inside being lined with lamb-skin. A hard rubber rod is placid within them, the length of one of the tubes, and fitting them so as to move somewhat freely from end to end, and the tube is raised to the connecting wire of the burner, this piece changes its place again falling into the tube held by the hand. The spark leaves the upper end of the tube at the same time and lights the gas.

The Table Light Burner consists of the same instrument arranged upon a pivot regularly attached to the pillar light.—*San Francisco Mining Press.*

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and gives the essential full strength and delicious flavor of OLD GOVERNMENT JAVA COFFEE, which is the only quality of Coffee used in its preparation, without any of that narcotic quality which so sadly damages the nervous system in the use of even the best grades of Coffee as ordinarily prepared.

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It is known to all acquainted with chemistry, that the essence, or oil, or whatever name may be given it, when properly and scientifically obtained from any herb or plant, is a far different article from that produced by putting that plant into water and boiling it out—permitting the escape of the most exquisite and reliable strength and leaving the coarse and earthy drugs precipitated or in solution.

So this preparation combines the exquisite aroma of the Java Coffee, with the highest essential excellence of the most choice Dandelion—yielding the spirit without the grosser earthy body of both; thereby avoiding the deleterious effects of both and becoming at the same time

The most Delicious Beverage

AND THE

Most Health-giving and Restoring Drink

Known in the world—being at once a sovereign remedy instead of producer of

Dyspepsia and General Nervous Debility,
Flatulence, Fulness of the Head,
Dizziness, Costiveness, and
diseases of the Liver
and Kidneys,

because of its great Tonic and Diuretic qualities.

The simple fact that the preparation is from Baron Leibig, will commend it to the attention of the scientific in all parts of the country, while the use of it will at once and permanently prove to the masses everywhere that it is the long-needed desideratum—in its way.

The immense popularity of this Coffee in the Old World is an earnest that its use and popularity in America is bound to become continent wide.

Another consideration not to be overlooked in regard to the matter, is that

It Costs Less than Ordinary Green Coffee.

And requires less than half the quantity to give the same degree of strength, and its use proves it at 30 cents a pound to be cheaper than Maricaibo coffee at 15 cents a pound.

Neatly packed in pound papers, with full instructions for use on each label—in SIXTY POUND BOXES. Price, 30 cents per pound. A liberal discount to the trade.

Manufactured by the PEOPLE'S PROVISION CO., 268 Greenwich street, N. Y., to whom all orders may be addressed.

Sold by wholesale Grocers and Druggists.

Carrington & Co.'s
GENERAL
PURCHASING AGENCY,
In Connection with all the Expresses,
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Established 1854.

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Goods purchased at current City prices, and forwarded by Express, or as directed.

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Remittances, with orders, can be made by Express if preferred, as all Express Agents will take orders, receipt for and forward funds, and see to return of Goods.

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The Adams Express Company, appreciating the need of a capable medium connecting with the various Express Lines, through which personal and other orders for goods from this city, can be satisfactorily supplied, do recognize CARRINGTON & CO.'S GENERAL PURCHASING AGENCY as such medium for filling orders for every description of goods wanted from New York, and commend it to the attention of the public, and of our general and local agents, recommending our agents to extend to it all reasonable aid, by facilitating the distribution of its cards and circulars, and making known the advantages it affords.

ADAMS EXPRESS CO.
By W. B. DINSMORE, Prest.
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We cheerfully concur in the above recommendation of the Adams Express Company.

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Manufacture Wrought Iron Welded Tubes for Gas, Steam or Water; Lap-Welded Boiler Flues, GALVANIZED WROUGHT IRON TUBES,
ARTESIAN WELL PIPES,
of Wrought or Cast-Iron, screwed together, flush inside and out; Gas-works Castings, Retorts and Bench Castings for Coal Gas-works,; Cast-Iron Street Mains, Bends, Branches, Drips, &c.
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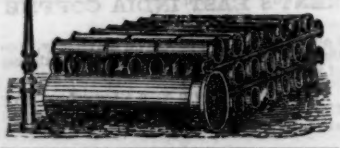

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Sewer Pipes extensively used in Brooklyn, and now introduced in New York, Jersey City, Newark, Hartford, Albany, and other localities, from 8 to 24 inches in calibre.
Water Pipes, lined and coated with Cement mortar, ready for laying and back filling, and can be tapped like cast-iron pipes, which they excel in durability, discharge, and economy.
Factories { Cor. Bond & Union sts., Brooklyn. " Washington & South 8th sts., Jersey City.

CLARK'S PATENT STEAM AND FIRE REGULATOR CO., sole Patentees and manufacturers of CLARK'S PATENT STEAM AND FIRE REGULATOR, No. 5 PARK PLACE, New York.
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FLORENCE IRON WORKS.—The subscriber is prepared to execute orders and make contracts for Cast-Iron Water and Gas-Pipes, from 2 inches to 48 inches in diameter; also, Retorts, Bench-Castings, Branches, Bends, and all Castings for Water or Gas-Works. Pipes and Castings coated with Smith's Patent Coal Tar Varnish to prevent corrosion.
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GAS APPARATUS
Of the most reliable and approved construction manufactured and on hand at the
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PATENT WATER-METER.
This Meter combines
ACCURACY, SIMPLICITY, and
REMARKABLE DURABILITY,
with such ease and certainty of motion, as to offer no appreciable obstructions to the flow of water in the pipes to which it is connected, as it runs and registers upon three inches head, or when delivering the smallest stream. These qualities, with its low cost, have caused its extensive adoption by corporations and individuals, in many of our largest cities.
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"HER MAJESTY"
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THE ROYAL WINE OF ENGLAND.
A limited quantity of this delicious and superior Wine has been secured for the undersigned, and the first shipment of 500 cases has arrived this day, by the steamship "Olympus," from Havre.
It comes direct from the cellars of the well-known house of Messrs. DE VENOGE & CO., at Epernay, France, and the present invoice will be introduced into this market at the very low price of
Thirty Dollars per Case of Quarts.
Payable in currency, which is much below its actual first cost.
The superior quality of this Wine is guaranteed, and it is offered with every confidence of its entire approval by connoisseurs, and lovers of a fruity, full-body wine.
Orders for one or more cases may be addressed, by letter or otherwise, to the undersigned,
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Quarts, $30. No. 7 Broad st., near Wall,
Pints, $32. New York.

THE AUBIN
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Of Albany, N. Y.,
Now contract their works to make 10,000 feet of good Gas from 2,000 pounds of *hard* wood and 40 gallons of kerosene tar, *before payment can be demanded;* and the charcoal is worth the cost of the wood.
Many Village Gas Companies can be referred to.

D. PARRISH, Jr.,
GAS ENGINEER
And Contractor for Coal or Oil Gas-Works.
Estimates given for Gas-Works, Gas-Holders, or any Gas Apparatus.
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To Manufacturers of Petroleum Gas.
For sale, Parrish's Patent Gas and Air Mixer, adapted to all works using Petroleum or other oils, by which rich Petroleum Gas is mixed, after it leaves the holder, with a proper proportion of air, giving it the greatest illuminating power, without smoke, through any burners. The apparatus being attached to the outlet pipe, requires no alteration of the works.
Apply at the Gas-Works of St. Nicholas Hotel, No. 63 Mercer st., N. Y., where one can be seen in operation; or address D. Parrish, Jr., St. Nicholas Hotel, New York city, or No. 1416 Arch street, Philadelphia.

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C. GEFRORER,
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For Lighting and Heating Purposes.
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ESTABLISHED 1830.
LAMBERT BROTHERS,
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PATENT ECONOMIZING
GAS-BURNERS,
Regulated to burn without noise or fluttering at sixth-tenths to eighteen-tenths pressure. Last twenty Scotch tips. Price from 8s. to 40s. per gross; liberal allowance to wholesale buyers. Any size for any gas (coal, wood, or cannel) screw either taper s/8, s/4, or plug.

500 Tons Cast-Iron Water-Pipes Wanted.

OFFICE OF THE BOARD OF PUBLIC WORKS,
CHICAGO, Ill., May 25th, 1864.

SEALED PROPOSALS WILL BE received at this office until 11 o'clock, A. M., Saturday, June 4th, for FIVE HUNDRED TONS of 4, 6, and 8 INCH WATER-PIPES, to be delivered at the dock of the Board, in Chicago, on or before October 1st next, according to specification on file in this office, copies of which will be furnished, if desired.

The pipes may be in lengths of 9 feet or 12 feet, but the length of 12 feet will be preferred. For 9-feet pipes the weight will be, respectively, for 4, 6, and 8-inch pipes, 220 lbs., 330 lbs., and 450 lbs., and for 12-feet pipes in proportion.

Bids must be directed to the Board of Public Works, endorsed "Proposal for Water-pipes."

The Board reserves the right to reject any or all bids.

J. G. GINDELE, FRED. LETZ, O. J. ROSE, } Board of Public Works.

H. P. GENGEMBRE'S
PATENT
NON-FREEZING & NON-EVAPORATING FLUID,
For Filling Wet Gas-meters,
AND
For Cheaper than any other Meter-fluid in use.
WARRANTED
Not to corrode tin, iron, brass, zinc, or drum-metal.
To be less injurious to wet meters that water.
Not to freeze at 20 degrees below zero, Fah.
Not to evaporate when in use in the meters, meters once filled with it requiring no further attention whatever for years.
The summer is the proper time to fill them.
SIX YEARS OF SUCCESS!
Five years in general use in works using it, to the exclusion of all other fluid, and driving the dry meter out of use, enables us to recommend our patent with perfect confidence.
For information and references, apply to
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THE GAS-POWER ENGINE,
MOTEUR LENOIR.

Messrs. BARRETT, EXALL & ANDREWES

Having made arrangements with the proprietors of the above valuable Patent, on terms which must command its introduction into Great Britain and her colonial dependencies, are desirous of at once arranging for the formation of a Company under the Limited Liability Act.

Believing that the value of the Patent to Gas Companies cannot be over estimated, and that it is destined to occupy a sphere in powers which, though enormously extensive, have never yet been worked; and believing also that the Gas Companies should have the first opportunity of possessing it, Messrs. B. E. and A. will be happy to receive any communications with a view to that result before they introduce it to the public.

The manufacture will be at once commenced with the 3, 2, 1, and ½ horse powers. They are in form like a horizontal steam engine; require no boiler, chimney, or expensive setting; are elegant in appearance, perfectly clean, free from smell, and can be set to work at a minute's notice—the cost ceasing when they are at rest.

THEY ARE ABSOLUTELY FREE FROM DANGER,

either from explosion or fire, and require the minimum of attention.

Address as above, at

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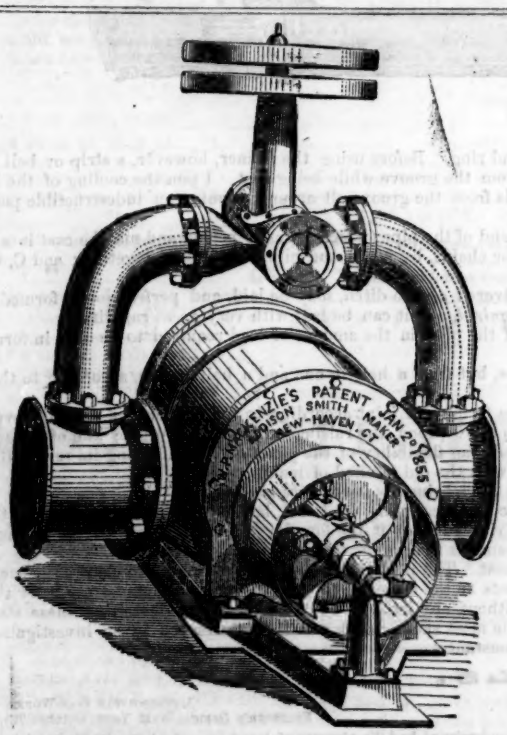

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Sole Proprietors and Manufacturers of

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AND

PATENT COMPENSATOR.

They are made to pass from 4,000 to 150,000 cubic feet of gas per hour; will increase the production and illuminating power of the gas, and add very much to the durability of the retorts, either clay or iron. The Compensator obviates entirely the necessity of water-joints, is compact, durable, cleanly, not liable to get out of order, self-acting, quiet, and certain in its operation.

We are also sole proprietors and manufacturers of the

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The Blower is a Force Blast machine, durably built, and can be driven with one-third the power required to drive the ordinary Fan. The Cupolas are manufactured in sizes to melt from 1 ton to 20 tons per hour, will save one quarter of the time required by the old style Cupola, and 33 per cent. uel Address SMITH & SAYRE, 458 Broadway, New York.

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PRACTICAL GAS METER MANUFACTURERS,

Continue, as heretofore, at their old Establishment,

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WET AND DRY GAS METERS (Consumers'),
STATION, EXPERIMENTAL AND SHOW METERS,
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FLUID AND PRESSURE GUAGES,
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All our work warranted. All orders addressed to

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DRAKE'S
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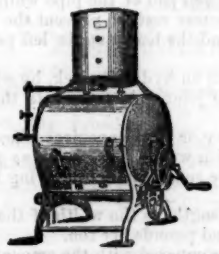
AUTOMATIC GAS MACHINE.



THIS MACHINE, which has been in constant use for more than two years, is now acknowledged to be the

Most Convenient,
Simple, and
Efficient Method

OF LIGHTING BUILDINGS OF ALL KINDS, out of the reach of regular gas-works, ever brought to public notice.

The SIMPLICITY OF THE APPARATUS, its ENTIRE FREEDOM FROM DANGER, the LITTLE ATTENTION REQUIRED, the EASE WITH WHICH IT IS MANAGED, and THE CHEAPNESS and SUPERIORITY OF THE LIGHT, has gained for it the favorable opinion of those acquainted with its merits.

The Machine takes up but little room; no disagreeable odor is experienced in its use; no fire is applied to the apparatus at all; it can be attached to ordinary gas-pipes used for coal-gas, and is burned through the same kind of fixtures.

These Machines are manufactured in Boston, by the AUTOMATIC GAS-MACHINE CO., and are for sale at their Store, 78 Washington street, Boston, and also at the Agency, MITCHELL, VANCE & CO.'s, No. 620 Broadway, New York.

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PRINCE'S METALLIC PAINT,

AN INDESTRUCTIBLE COATING FOR

IRON, TIN, and WOOD.

It consists of seventy-two parts Oxide of Iron, and twenty-eight parts Cement Lime Stone in the one hundred pounds.

It has much more body than red or white lead. It is warranted perfectly water and fire-proof and to withstand a greater heat on metals, without scaling, than any other paint in use.

It is a perfect cover for all kinds of iron, tin, or wood-work, out-houses, and canvas coverings. It prevents and arrests the corrosion of metals, and is not affected by the action of salt, gases, acids or ammonia.

It hardens under water, as has been fully demonstrated by its application to gas-holders, by many of the largest gas companies in the United States; which companies having thoroughly tested its properties as herein claimed, pronounce in its favor over any other paints in the market, even though sold at double its price.

As a coating for patterns of iron or wood, when mixed with shellac, it is much superior to beeswax, oil, or shellac alone, as has been proven at the large founderies in the country.

For patching boilers and making joints, it is considered superior to red lead, or any other preparation.

For cleaning metals it takes the place of crocus, rouge, and emery, being better and cheaper.

This Paint requires no more oil than dry lead or zinc, and much less than the ordinary mineral paints. It is free from any waste, and possesses a spreading and covering power unequaled.

Terms, by the Barrel or Half Barrel, Four Cents per Pound.

A liberal discount made to parties purchasing by the ton.

A Barrel or Ton will be forwarded to any gas companies desirous of testing its qualities, for which there will be no charge if it does not give entire satisfaction as being the cheapest and most durable of all other Paints in the market.

Also, Prince's Imperial Black Paint, and Prince's Protoxide of Iron.

DANIEL SLOAN, General Agent,
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Local Agents—S. R. WILLIAMS, 204 South Front st., Philadelphia.
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ROBBINS' PATENT GAS AND WATER JOINT.

THE PROPRIETORS of this unrivalled joint are now prepared to introduce it to general use, and to guarantee that, in all respects, it will fulfil perfectly all the requirements of either water, gas, or steam. It is a joint which remains in all situations absolutely tight.

The following illustrations, with the appended explanations, will give a good idea of the improvement:

Fig. 3.

Fig. 1.

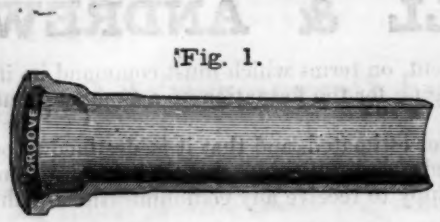


Fig. 2.

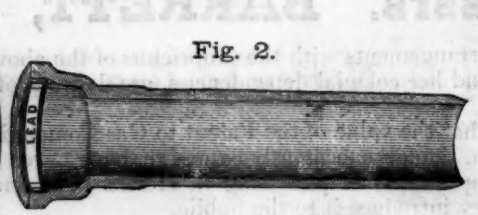


Fig. 4.

FIG. 1. Is a sectional view of a pipe showing a groove to receive a lead ring.

FIG. 2. Is a sectional view of a pipe showing a lead ring in the groove.

FIG. 3. Represents a former, which is used in the bell end of the pipe while casting the lead ring. Before using the former, however, a strip or belt of India rubber is first inserted in the socket, against which the former rests to prevent the lead escaping from the groove while being cast. Upon the cooling of the lead, the former and rubber ring are withdrawn from the socket, and the lead ring is left projecting inwards from the groove all around, forming an indestructible packing to receive the spigot-end of the pipe.

FIG. 4. Shows two pieces of pipe in connection with an hydraulic jack, by which the spigot-end of the pipe (which is cast tapering and may be cast in a chill), is forced into the lead ring in the groove which perfects the joint. A, represents the jack; B, B, the chains by which the pipes are drawn together; and C, C, pieces of pipe.

This ring joint packing may be cast at the foundry or any convenient place, and when delivered at the ditch, may be laid, and perfect joints formed, by any laborer, above or below the surface, or in ditches filled with water, there being *no joint ditching required*, and it can be laid with very great rapidity.

Among the economics realized by this joint may be enumerated, the saving in the weight of the pipe, in the amount of lead required to be used in forming the packing, in the labor of ditching, and in laying the pipe.

The bell or socket may be cast one-half the usual length, as the width of the groove requires, but from a half to one and a half inches, according to the size of the pipe, thus saving in the total weight about two hundred pounds per ton.

The weight of lead required to form this joint, as compared with the amount of lead used in forming a joint according to the old method, is fully seventy-five per cent. less, only so much being required as to maintain the compensating principle, or enough to allow (upon the raising or depressing of the line of pipe out of a direct line) what is lost upon one side of the ring packing, to take its place upon the other; thus securing flexibility of the joint without affecting its reliability. The use of yarn or hemp packing is dispensed with, the cost of which is an entire saving as compared with the old method of making joints.

The saving of labor in ditching is the total amount usually expended in digging joint-holes, there being *no joints to be caulked.*

The saving in labor in laying pipe furnished with this joint is a sum equal to the whole cost of carrying lead, fuel, ladles to the ditches, casting the lead, bailing out water, and the entire labor of caulking, less only the sum charged for casting the lead ring packing at the foundry, which is comparatively trifling. This last-mentioned economy has been estimated by the best engineers at seventy-five per cent., or the same as the saving in the quantity of lead used.

The cost of pipe cast from our patterns is the same per ton as pipe cast for the old form of joint. The principal iron-founders propose to charge the same price.

We have submitted these joints in water-pipes to a pressure of two hundred and fifty pounds to the square inch, and they have remained perfectly tight. It has also been submitted for months in gas-pipes to the ordinary pressure of our city gas-mains, without any leakage whatever. We are aware that these statements may be deemed by many extravagant, but the merits of the improvement warrant them all, and the most skeptical may be fully convinced by an investigation of its value, and by witnessing the tests to which we submit it, or by its use under any conceivable circumstances.

TESTIMONIALS.

OFFICE OF THE WATER COMMISSIONERS,
CITY HALL, JERSEY CITY, October 14th, 1863.

Dear Sir,—On the 26th of May last, about two hundred and sixty feet of cast-iron water-pipes, six inches in diameter, with joints constructed according to your invention, were laid for the Jersey City Water-Works, in Prospect street.

The operation of uniting the joints of the pipes, was performed with remarkable facility, and with an important saving in time, materials, and labor. The joints proved perfectly water-tight, after turning the full head of water on the pipes.

In my opinion, your invention has proved entirely successful, and will be found highly beneficial to water companies.

Yours, respectfully,
ROBT. C. BACOT,
Superintendent and Engineer, Jersey City Water-Works.

MR. R. C. ROBBINS.

ENGINEER'S OFFICE, CROTON AQUEDUCT DEPARTMENT.

Dear Sir,—I have examined your plan for making joints in cast-iron water pipes, and have a report from one of my assistants, of certain experiments made by you, to prove the certainty and economy with which the joints can be made, and their stability when finished.

I think the experiments showed that the joints could be made quite as rapidly, if not more rapidly, than those made in the ordinary method now in use; the quantity of lead used was less than that required in the common joint, and no yarn packing was required. In these respects, your joint seems superior.

After the joints were made, a pressure of three hundred pounds to the square inch, was put upon he pipe in such a manner as to test the efficiency of the joint to prevent both leakage of water, and separation of the pipes from each other longitudinally. This pressure failed to produce either leakage at the joint, or separation, so long as the pipes lay in a direct line; but on deflecting them six and a half inches, in a length of twelve feet, the joint commenced leaking. It is fair to add, that this is a greater deflection than would often be found necessary in laying pipe.

I think the efficiency of the joint in b th the points tested in this last experiment, might be increased by increasing the quantity of lead, both in thickness and width.

Altogether, the result of the experiments was such that I have determined to make a more thorough test of your invention by putting down about one thousand feet of pipe, when we commence our operations for the coming season.

The diameter of the pipe subjected to experiment, was six inches, and is the same size that I propose to put down next year.

I am, very respectfully, your obedient servant,
A. W. CRAVEN, Chief Engineer, &c.

To R. C. ROBBINS, Esq., Jersey City.

METROPOLITAN GAS-WORKS,
ENGINEER'S OFFICE, NEW YORK, October 9th, 1863.

Dear Sir,—The undersigned had the pleasure of being present at an experimental test of your patent joint for gas and water pipe, made at the yard of the Croton Aqueduct Department, and cheerfully testify to the results obtained, namely:

First experiment was made with two lengths of eight-inch pipe, jointed together, when a pressure of three hundred pounds to the square inch was applied. This pressure did not force the pipe apart, nor start the joints, but they remained, during this experiment, perfectly tight.

Second experiment was made by deflecting the pipe five inches, which is about equal to eighteen inches in one hundred feet, and the same pressure applied, which caused a small leak at the joints.

Third experiment was made by taking the pipes apar and rejointing them, when the same pressure was applied when lying straight and when deflected; at this experiment there was no leakage.

From these severe tests it is my impression that the superiority of your patent joint has been made manifest, and that it must eventually supersede the old way of jointing pipes together, saving both time and material.

Wishing you success in your enterprise,
I am, very respectfully, yours, &c.,
AMBROSE J. WHITE, Engineer.

To R. C. ROBBINS, Esq.

OFFICE OF THE METROPOLITAN GAS-LIGHT COMPANY,
NEW YORK, October 9th, 1863.

Dear Sir,—Having been present at the testing of your patent joint for gas and water pipe, at the yard of the Croton Aqueduct Department, I can testify to the results as stated by Col. A. J. White and fully concur with him in the opinion expressed in his letter to you of this date.

Very respectfully, yours,
W. TITUS, Secretary.

R. C. ROBBINS, Esq.

NEW YORK, October 23d, 1863.

Gentlemen,—I am pleased to be able to inform you, that we are fully satisfied that we have done well in adopting your "Improved Joint," in the construction of an aqueduct which we are now building on Oil Creek, Northwestern Pennsylvania.

We have ten miles of three and four inch pipe to lay this season, and, in our estimation, the perfection of the joint, economy in lead, and rapidity with which the pipe can be laid, render it entirely preferable to any other method of laying pipe.

Our Mr. Hutchings advises us that he is putting down the three and four inch pipe at the rate of twenty-five to thirty lengths per hour, with two men in the trench. We are much pleased with this result.

Respectfully yours,
HUTCHINGS & FOSTER.

Messrs. R. C. ROBBINS & Co.

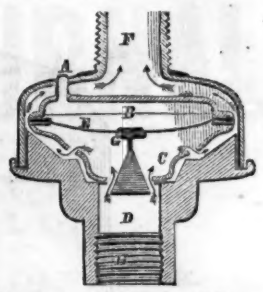
For further information, or for prices and terms, which will be very reasonable, apply to

R. C. ROBBINS & CO.,
No. 218 FULTON STREET, NEW YORK

THOMPSON'S

PATENT

AUTOMATIC GAS CONTROLLER.



Notice to Gas Companies and Consumers of Gas generally.

WE RESPECTFULLY INVITE YOUR ATTENTION TO THE FOLLOWING TRUTHFUL DESCRIPTION OF THE construction and operation of this recent and most important invention; its application to every street lamp, and on the fixtures within the works of the Gas Companies, as well as for the use of the general consumer, will be found to effect perfectly and reliably, the object so long sought for, viz.: **a perfect control of the Gas under varying pressures, emitting the Gas at the burner without force, and without increase or diminution of quantity, and hence promoting the highest possible illuminating power of the Gas.**

THE AUTOMATIC GAS CONTROLLER

Is designed to occupy the place of the gas-burner. Within the circumference of a small cylinder, below the burner, is placed a conical valve, attached to a movable diaphragm, the valve and valve seat is proportioned, so that under a supply of Gas, varying in pressure from four-tenths to five inches, the burner will continue to produce the same consumption and development. The unerring accuracy of movement of the Diaphragm at every change of pressure, whether gradual or sudden, and its positive control of the valve which admits, by its proportionate increased or diminished aperture, the same unvarying amount of Gas, has elicited the unqualified approbation of engineers and other experts in the profession.

The simplicity of its construction, and materials used, are a sure guarantee of its durability and continued successful peration. They afford to the consumer of Gas the advantage of a **superior light, with the greatest possible economy**; and for the Gas Company, they control o the Street Lamps, affording a more satisfactory light for the public, without waste.

The public are invited to witness its operation, at the Office of the Company; and samples will be sent to Gas Companies for experiment, on application by letter or otherwise.

G. W. THOMPSON & CO.,

Office, 52 GREENE ST., (up stairs.)

A. L. BOGART, AGENT, 592 BROADWAY,

New York.

We are permitted to refer to the following Gentlemen, who have thoroughly examined our Gas Controller:

GEO. H. KITCHEN, Inspector of Gas Meters, 561 Broadway.
CHAS. ROOME, President Manhattan Gas Company.
J. H. ADAM, President New York Gas Company.
PETER COOPER, Cooper Institute.
JOHN A. DUFF, Olympic Theatre.

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This Company is now prepared to furnish WET AND DRY GAS METERS, STATION METERS, GOVERNORS, PRESSURE INDICATORS a REGISTERS, SERVICE and METER COCKS, and all other articles in their line appertaining to the use of Gas-Works.

The combination of Mechanical and Scientific Skill, and the long experience of the several members of the Company, is a sure guarantee of durability, accuracy, and excellence of workmanship. Orders addressed

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For Country Residences, Public Buildings, &c.,

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EVERY DESCRIPTION OF GAS FIXTURES.

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THE UNDERSIGNED DESIRES TO undertake the supervision of several small Gas-works, to visit and examine them as often as may be necessary; to obtain and inspect their coal, castings, fire-brick, and other materials; and to manage their general business in such a manner that they shall be under such supervision as is now attainable in large works, at much increased cost. Also, to advise as general Consulting Engineer and expert in practical chemistry.

CHAS. M. CRESSON,
Late Asst. Engineer of the Philadelphia Gas-works,
417 Walnut st., Philadelphia.

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Analyses of Ores, Minerals, Soils, Guanos, Coals, &c., and Tests of Commercial Articles, carefully and promptly made. Consultations may be had, and opinions given on Chemical questions. Samples for analysis from a distance, may be sent by mail or express, directed to the Laboratory as above.

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Cheaper than Whisky or any other substance.

We have furnished the Cincinnati Gas and Coke Company 300 barrels Glycerin, for filling their wet meters, and are now ready to supply other Gas Companies at the lowest cash prices.

We warrant our Glycerin not to corrode the meter metal, nor to freeze at the lowest ordinary temperature, nor to evaporate.

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GAS RETORTS, TILES and FIRE-BRICK of all shapes and sizes. FIRE MORTAR, CLAY, and SAND. Articles of every description made to order at the shortest notice. B. KREISCHER.

WOODEN PURIFYING TRAYS.

PATENT

Conically Slotted Solid Wood Sieves

FOR GAS PURIFIERS.

CAUTION

TO

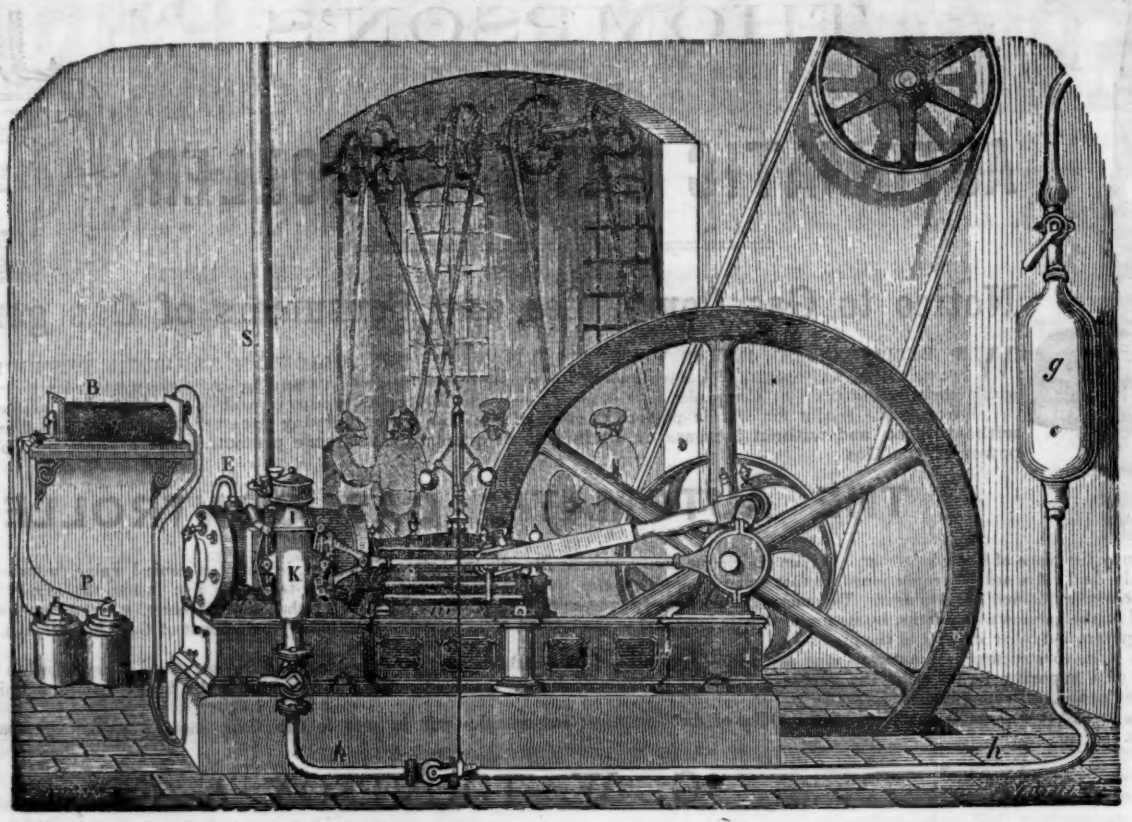
GAS MANUFACTURERS.

The Conically Slotted Solid Wood Tray was patented 21st October, 1862, by N. O. Hawxhurst, assignee of Wm. Combe, and all persons are cautioned against purchasing such trays of R. G. Hunt, or any other person except the subscriber, as it is a direct infringement of said patent. The following companies are now using these trays.

Manhattan, New York,
Williamsburgh,
Brooklyn,
Albany,
Baltimore,
Philadelphia,
Chicago.
Louisville,
And numerous others.

Orders received by mail or otherwise.

JOHN L. CHEESMAN,
147 Ave. C, New York City.



MOTEUR—LENOIR.

LENOIR GAS ENGINE.

This is a horizontal engine, in which a piston, by a connecting rod drives a horizontal shaft.

The gas enters by the pipe "h" from the regulating reservoir "g," (made of vulcanized india rubber,) which regulates the feeding and the branches connected with the gas-pipe.

The tube, K, receives the gas conveyed by the pipe "h," and conducts it to the valve, which opens and closes alternately, by means of a rod moved by an eccentric wheel fastened to the end of the shaft.

Two of Bunsen's piles, P, sufficient to produce the electricity are placed at a little distance from, and in communication with a Ruhmkorff electric apparatus, B. The electric current of this apparatus is conducted by means of insulated wires to the electricity distributor "m," placed on the front of the frame, while the current of electricity and its arrival at the inflammator, inserted at each end of the cylinder, is directed by the movement of the piston-rod, which, by an ingenious combination, impels a small movable slide before the distributor.

The burnt gas, after having performed its functions in the machine, escapes, by means of a valve, through a pipe, S, and the water designed to cool the interior of the cylinder enters by a double passage, by means of a pipe situated near the escape-valve, and goes out by the pipe, E.

A two-and-a-half horse Engine is now in practical operation at the brass cock manufactory of Mr. A. Carr, *No.* 135 *Mercer Street, between Prince and Houston Streets,* where those interested are invited to call and examine it.

THE LENOIR GAS ENGINE

Requires no Fire and makes no Smoke,

No Noise, no Dirt, and is thoroughly safe.

It is propelled by the expansion of Air, dilated by the combustion of Gas within the cylinder, ignited by the

ELECTRIC SPARK.